

Health and Safety Plan

for

881 Hillside Area

Operable Unit No. 1



EG&G ROCKY FLATS

Manual No. H&S OU-1

HEALTH AND SAFETY PLAN

FOR

881 HILLSIDE ENVIRONMENTAL RESTORATION

October 3, 1990

DRAFT FINAL

EG&G- Rocky Flats, Inc.

U NO

REVIEWED FOR CLASSIFICATION/UCM	
BY	G. T. Ostdiek <i>870</i>
DATE	4-14-93

"REVIEWED FOR CLASSIFICATION
By *A. L. Hyatt - 11-*
Date *10-11-90*

October 17, 1990

To: Distribution

From: Larry Grocki 

Re: Draft Final of the Health & Safety Plan for 881 Hillside
Environmental Restoration

This is the draft final version of the Health & Safety Plan for EG&G employees working at the 881 Hillside (OU-1). It is meant to be a working document and therefore will be revised periodically, as needed. Any subsequent changes to this document will be issued by page only. The entire document will not be reproduced. Please document any requests for changes to the plan on the attached correction form and return to me at T-452 B.

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TABLE OF CONTENTS
EG&G — ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT DEPARTMENT

1.0 INTRODUCTION 1-1

1.1 Policy 1-1

1.2 Contents of Plan 1-1

1.3 Background 1-2

1.4 References 1-6

2.0 HEALTH AND SAFETY RESPONSIBILITIES 2-1

2.1 Introduction 2-1

2.2 Assignment of Responsibilities 2-1

2.2.1 Division Managers 2-1

2.2.2 RP Project Manager 2-2

2.2.3 ER Health and Safety Officer 2-2

2.2.4 H&S Liaison Officer 2-3

2.2.5 Site Health and Safety Coordinator 2-3

2.2.6 Health and Safety Area Engineer 2-4

2.2.7 Industrial Hygiene Representative 2-4

2.2.8 Radiological Operations Area Manager 2-5

2.2.9 Radiological Engineering Representative 2-5

2.2.10 Occupational Health Director 2-5

2.2.11 Fire Protection Representative 2-6

2.2.12 Subcontractor Health and Safety Officer 2-6

2.3 881 Hillside Personnel 2-7

3.0 HAZARD ASSESSMENT 3-1

3.1 Introduction 3-1

3.2 Chemical Contaminant Background Characterization 3-1

3.2.1 Soils 3-2

3.2.2 Ground Water 3-2

3.2.2.1 Surficial and Deep Bedrock Samples 3-3

3.2.2.2 Unconfined Flow System Samples 3-4

3.2.3 Surface Water 3-4

3.2.4 Sediments 3-5

3.2.5 Air 3-5

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TABLE OF CONTENTS (CONT)

3.3	Chemical Hazards	3 - 5
3.3.1	Pathways and Exposure Routes	3 - 5
3.4	Radiological Contaminant Background Characterization	3 - 8
3.4.1	Soils	3 - 8
3.4.2	Ground Water	3 - 9
3.4.3	Surface Water and Sediments	3 - 9
3.4.4	Air	3 - 9
3.5	Radiological Hazards	3 - 9
3.5.1	Pathways and Exposure Routes	3 - 9
3.6	Summary of Chemical and Radiological Hazards	3 - 10
3.7	Physical Stress	3 - 13
3.7.1	Cold Exposure	3 - 13
3.7.2	Heat Stress	3 - 14
3.7.3	Noise Exposure	3 - 15
3.8	Mechanical Hazards	3 - 15
3.9	References	3 - 27
4.0	HAZARD COMMUNICATION	4 - 1
4.1	Introduction	4 - 1
4.2	Hazardous Materials Inventory	4 - 2
4.3	Material Safety Data Sheet	4 - 2
4.4	Training	4 - 3
5.0	SITE CONTROL	5 - 1
5.1	Objectives	5 - 1
5.2	Site Control Designations	5 - 1
5.2.1	Restricted Area	5 - 2
5.2.2	Controlled Area	5 - 2
5.2.3	Task Specific Exclusions Zones	5 - 3
5.3	General Operating Procedures	5 - 3

TABLE OF CONTENTS (CONT)

5.4	Medical Assistance	5 - 4
6.0	PERSONAL PROTECTIVE EQUIPMENT.....	6 - 1
6.1	Introduction	6 - 1
6.2	General Application of PPE	6 - 2
6.3	PPE Issues Applicable to All Site Personnel	6 - 2
6.4	Restricted Areas.....	6 - 3
6.5	Solid Waste Management Units	6 - 3
6.6	SWMU 119.1	6 - 3
6.7	PPE Requirements for On-Site Spill Clean Up.....	6 - 4
6.8	Re-Use of PPE	6 - 4
7.0	DECONTAMINATION.....	7 - 1
7.1	Introduction	7 - 1
7.2	Decontamination Procedures	7 - 1
7.2.1	Personnel and Small Equipment Decontamination ..	7 - 1
7.2.2	Heavy Equipment Decontamination	7 - 2
8.0	MEDICAL SURVEILLANCE	8 - 1
8.1	Introduction	8 - 1
8.2	Frequency of Medical Examinations.....	8 - 1
8.3	Content of Medical Examinations	8 - 2
8.4	Availability of Service.....	8 - 4
8.5	Transportation for Medical Reasons	8 - 4
8.6	Occupational Health Department Responsibilities	8 - 5
8.7	Supervisor's Responsibility	8 - 5

TABLE OF CONTENTS (CONT)

8.8	Employee's Responsibilities	8 - 6
8.9	Work Practices	8 - 6
8.10	Medical Records	8 - 6
8.10.1	Release of Medical Records/Information	8 - 7
8.11	Subcontractor Medical Surveillance Program	8 - 8
9.0	AIR MONITORING	9 - 1
9.1	Introduction	9 - 1
9.2	Chemical Related Air Monitoring	9 - 1
9.2.1	Sampling Strategy	9 - 1
9.2.2	Monitoring	9 - 1
9.2.3	Procedures	9 - 2
9.3	Radiological Monitoring	9 - 3
9.3.1	Air Monitoring	9 - 3
9.3.2	Decontamination Verification	9 - 3
9.3.3	Surface Contamination Surveys	9 - 3
10.0	TRAINING	10 - 1
10.1	Training Requirements and Course Content	10 - 1
10.1.1	Hazardous Waste Site Health and Safety	10 - 1
10.1.2	Radiation Worker Training	10 - 2
10.1.3	Site-Specific Training	10 - 2
10.1.4	Hazard Communication Training	10 - 2
10.1.5	Safety Meetings	10 - 3
10.1.6	Rehearsal of Emergency Response Plan	10 - 4
10.1.7	Visitor Briefings	10 - 4
10.2	Implementation of Training	10 - 4
10.3	Performance Evaluations	10 - 5
10.4	Verification of Training	10 - 5
11.0	EMERGENCY RESPONSE	11 - 1
11.1	Purpose	11 - 1

TABLE OF CONTENTS (CONT)

11.2 Notification11-1

11.3 Specific Site Hazards11-4

11.4 Fires and Explosions11-4

11.5 Spills of Hazardous and Radioactive Mixed Waste
and Hazardous Material11-5

11.6 Post Emergency Response Equipment Maintenance11-5

11.7 Emergency Equipment Location11-6

11.8 Evacuation Plan11-6

11.9 Communication.....11-6

12.0 MATERIAL HANDLING.....12-1

12.1 Introduction12-1

12.2 Subcontractor Materials Handling Program12-1

13.0 NEW TECHNOLOGIES.....13-1

13.1 Introduction13-1

13.2 Program Implementation.....13-1

13.3 Methods of Evaluation13-1

LIST OF FIGURES, TABLES, AND APPENDICES

Figures

Figure 1-1	881 Hillside Site Map	1 - 7
Figure 1-2	881 Site Locator Map	1 - 8
Figure 2-1	EG&G Organization Matrix	2 - 9
Figure 2-2	881 Hillside H&S Organization	2 - 10
Figure 3-1	Borehole and Monitor Well Locations	3 - 24
Figure 3-2	SWMU Location Diagram	3 - 25
Figure 3-3	Surface Scrape Sample Locations	3 - 26
Figure 3-4	Building 891 Site Soil Sampling Locations	3 - 27
Figure 5-1	Radiological/HS&E Work Permit	5 - 5
Figure 5-2	Site Control Designations	5 - 7
Figure 5-3	Site Control Signage for 881 Hillside	5 - 8
Figure 5-4	Radiation Signage for SWMUs	5 - 9
Figure 7-1	Equipment Guidelines for Decontamination Operations	7 - 3
Figure 7-2	Decontamination Flow Guidelines (levels A & B PPE)	7 - 4
Figure 7-3	Decontamination Flow Guidelines for Level C PPE	7 - 5
Figure 7-4	Decontamination Layout - Level A PPE	7 - 6
Figure 7-5	Maximum Level A PPE Decontamination Procedures	7 - 7
Figure 7-6	Minimum Level A PPE Decontamination Procedures	7 - 8
Figure 7-7	Decontamination Layout - Level B PPE	7 - 9
Figure 7-8	Maximum Level B PPE Decontamination Procedures	7 - 10
Figure 7-9	Minimum Level B PPE Decontamination Procedures	7 - 11
Figure 7-10	Decontamination Layout - Level C PPE	7 - 12
Figure 7-11	Maximum Level C PPE Decontamination Procedures	7 - 13
Figure 7-12	Minimum Level C PPE Decontamination Procedures	7 - 14

Tables

Table 3-1	VOCs in Unconfined Ground Water	3 - 16
Table 3-2	Chemical Specific ARARs	3 - 18
Table 3-3	Results of Soil Sampling Program - 891 Building Site	3 - 21
Table 3-4	Surface Scrape Results - Radionuclides	3 - 22
Table 3-5	Threshold Limit Values for Noise	3 - 23
Table 6-1	OSHA Standards for use of PPE	6 - 6
Table 6-2	General PPE Inspection Checklist	6 - 7
Table 6-3	Example PPE Ensembles	6 - 10

FIGURES, TABLES, AND APPENDICES (CONT)

Table 9-1 Sampling Instrumentation Calibration Guidelines9 - 4
Table 9-2 Chemical Permissible Exposure Limits and Action Levels ..9 - 5
Table 9-3 Derived Air Concentrations9 - 6
Table 9-4 Contamination Control Limits (radiological)9 - 7

Table 10-1 EG&G Hazardous Waste Workers H&S Course Outline10 - 6
Table 10-2 Supervisor Training Course Outline10 - 8
Table 10-3 Hazard Communication Training Course Outline10 - 9

Appendices

Appendix 3-1 Chemical Data Sheets3 - 28

**881 HILLSIDE IRA
CONSTRUCTION PHASE 2A
(TREATMENT FACILITY EQUIPMENT INSTALLATION)
OPERABLE UNIT NO. 1**

**PROJECT MANAGEMENT PLAN,
WORK PROCEDURES,
QUALITY ASSURANCE PLAN,
SITE SPECIFIC HEALTH AND SAFETY PLAN**

**FOR
CONSTRUCTION**

JULY 1991

REVIEWED FOR CLASSIFICATION/ID
By George H. Seelock
Date 9/13/91 UNK

1.0 INTRODUCTION

1.1 Policy

EG&G-Rocky Flats Plant, Inc. (EG&G), in conjunction with the Department of Energy (DOE), has adopted the Federal Occupational Safety and Health Administration (OSHA) standard for hazardous waste site workers (29 CFR 1910.120). This Health and Safety Plan (HSP) addresses the requirements of this standard for EG&G personnel managing and monitoring activities at the 881 Hillside environmental restoration (ER) site and should provide information and guidance for Subcontractors when writing their site-specific HSPs. The intent of this written plan is to apply the performance requirements of the OSHA standard in a manner which best serves the health and safety of workers, visitors, and the surrounding population.

1.2 Contents of Plan

This HSP describes known hazardous materials and work operations associated with environmental restoration activities on the 881 Hillside sites (see Figure 1-2). This program is identified in the Interagency Agreement (IAG) as Operable Unit 1. The plan specifies responsibilities and authorities of EG&G personnel involved in the supervision of activities at this site. This plan further describes the requirements for medical surveillance, personal protective equipment(PPE), hazard communication, training, monitoring, decontamination, site control, new technology, and emergency response procedures.

The potential hazards associated with environmental restoration activities on the 881 Hillside sites have been assessed by reviewing historical activities and waste characterization studies performed during remedial investigations of the various Solid Waste Management Units (SWMUs) on the 881 Hillside. Based on the hazard assessment, plans for personal protective equipment, monitoring, decontamination, site control, and emergency response have been developed.

1.3 Background

A comprehensive, phased program of site characterization, remedial investigations, feasibility studies, and remedial/corrective actions is in progress at the Rocky Flats Plant (RFP). These investigations are pursuant to the 1986 Compliance Agreement among the Department of Energy (DOE), Environmental Protection Agency (EPA), and the Colorado Department of Health (CDH), which addresses hazardous and radioactive mixed waste management at the Plant. Analysis of hydrogeological and hydrogeochemical characterization data, obtained during installation-wide sampling in 1986, identified four areas as probable sources of environmental contamination, with each area containing several sites. The 881 Hillside Area was assigned the highest priority of the four due to elevated concentrations of volatile organic compounds (VOC) in the alluvial groundwater and the proximity of the area to South Interceptor Ditch and Woman Creek. From 1951 to 1972, portions of the 881 Hillside Area were used for oil sludge disposal, chemical burial, liquid disposal, solvent drum storage, fire damage refuse disposal, and disposal of potentially contaminated asphalt and soil. These practices have been discontinued [1]. Regulatory agencies, DOE and EG&G have agreed that enough historical events have occurred at the 881 Hillside supported by some environmental sampling data to merit interim restoration activities along with additional site characterization at this time.

The twelve sites located within Operable Unit 1, the 881 Hillside Area, are shown on Figure 1.1 along with Solid Waste Management Unit (SWMU) designations. These include:

1. oil sludge pit (SWMU 102),
2. chemical burial site (SWMU 103),
3. liquid dumping site (SWMU 104),
4. out-of-service fuel tank site (SWMU 105.1),
5. out-of-service fuel tank site (SWMU 105.2),
6. outfall site (SWMU 106),
7. hillside oil leak site (SWMU 107),

8. multiple solvent spill site (SWMU 119.1),
9. multiple solvent spill site (SWMU 119.2),
10. radioactive site - 800 Area Site #1 (SWMU 130),
11. sanitary waste line leak site (SWMU 145), and
12. Building 885 drum storage site (SWMU 177)

The following site descriptions are summarized from the 1990 Dept. of Energy Draft Phase III RI/FS Work Plan [2].

Oil Sludge Pit Site (SWMU 102)

Approximately 30 to 50 drums of oil sludge were emptied into a pit, 40 by 70 ft in size, located 500 ft south of Building 881, as shown by aerial photography in 1955. The pit appeared to contain oily liquids, and seepage was evident. Drainage from the pit appeared to be directed toward a small pond adjacent to Woman Creek. The oil sludge pit was covered after its use, and the pit and seepage are no longer visible on 1959 aerial photographs.

Chemical Burial Site (SWMU 103)

An area south of Building 881 was reportedly used to bury unknown chemicals, but the exact location, dates of use, and contents of the site are unknown. The original location was thought to be the same as the Oil Sludge Pit Site, however, a 50-ft circular pit, apparently filled with liquid, is shown about 150 ft southeast of Building 881 on 1963 aerial photographs.

Liquid Dumping Site (SWMU 104)

An area east of Building 881 was reportedly used for disposal of unknown liquids and empty drums before 1969. After further review of historical photographs, a 50 by 50-ft area,

appearing on 1965 aerial photographs, may simply have been a shadow. The Liquid Dumping Pit Site may be the same location as the Chemical Burial Site. This will be verified through additional investigation.

Out-of-service Fuel Tank Sites (SWMU 105.1 and 105.2)

Two out-of-service fuel oil tanks are located immediately south of Building 881. Asbestos was placed in the tanks, which were later filled with concrete. The exact dates of these activities are unknown.

Outfall Site (SWMU 106)

A 6-inch vitrified clay pipe outfall, south of Building 881, discharged water in December 1977. Previous reports indicated that this was a cleanout pipe for an overflow line from the Building 881 cooling tower, but construction drawings indicated that the pipe is an overflow line from the sanitary sewer sump in Building 887.

Hillside Oil Leak Site (SWMU 107)

An oil leak was discovered on the hillside south of Building 881 in May 1973. The source of the oil was believed to be the two fuel oil tanks south of the building, but pressure testing of the tanks and associated lines did not reveal any leaks. The oil spill was contained with straw, and the straw and soil were removed and placed in the present landfill north of the Plant. It was later discovered that the oil had emerged through the Building 881 footing drain outfall. A ditch and concrete skimming pond were built below the footing drain outfall to contain the oil. These structures are still present, although no oil has been observed in the outfall since 1973.

Multiple Solvent Spill Sites (SWMU 119.1 and 119.2)

Two areas east of Building 881, along the southern perimeter road, were used as storage areas for barrels which contained unknown quantities and types of solvents and wastes. The site boundaries shown on Figure 1-1 represent the extent of soil disturbance associated with the sites. Barrel storage in these areas was discontinued, and all barrels were removed by 1972.

Radioactive Site - 800 Area #1 (SWMU 130)

An area east of Building 881 was used between 1969 and 1972 to dispose of Plutonium (Pu)-contaminated soil and asphalt. The materials deposited at this site came from three sources: Pu-contaminated soil and asphalt from the 1969 fire in Building 776, a section of Central Avenue contaminated by a leaking drum in 1968, and Pu-contaminated soil from the vicinity of Building 774 process waste tanks in 1972. Material from the 1969 fire was buried under 1 to 2 ft of fill dirt, the contaminated soil from the third source was placed on top of previously deposited soils and covered with approximately 3 ft of fill dirt.

Sanitary Waste Line Leak Site (SWMU 145)

A 4-in, cement-asbestos sanitary sewer line, located south of Building 881, leaked in January 1981. An earthen dike was constructed to prevent the spill from entering the South Interceptor Ditch, and the line was repaired. The line conveyed sanitary wastes to the sanitary treatment plant and did not carry hazardous or radioactive materials. Conveyance of laundry wastewater, which may have contained low levels of radioactive materials, was discontinued in 1973.

Review of Building 881 construction drawings indicates that the only sanitary waste lines, presently located south of the building, are the 6-in overflow line from Building 887 and an 8-in vitrified clay pipe which runs east-west into Building 887.

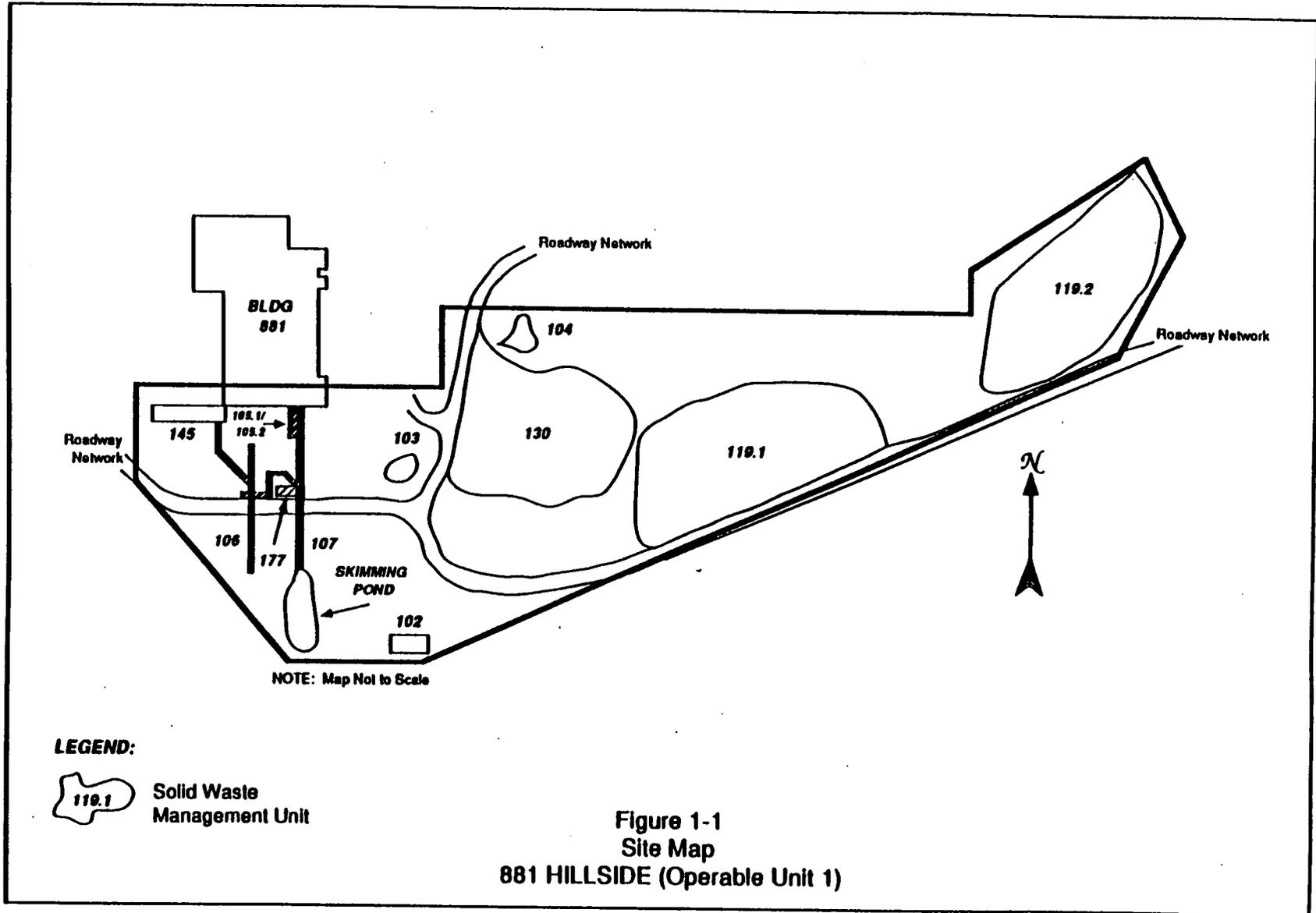
Building 885 Drum Storage Site (SWMU 177)

Building 885, immediately south of Building 881, is currently used for satellite collection and 90-day accumulation of RCRA regulated wastes. The building will be closed under RCRA Interim Status (40 CFR 265). Complete information on this solid waste management unit is provided in the RCRA Interim Status Closure Plan, which is appended to the revised Post-Closure Care Permit Application for hazardous and radioactive mixed wastes at the Rocky Flats Plant. Any groundwater contamination from this site will be addressed by the remedial action for Operable Unit No. 1 [2].

1.4 References

[1] Department of Energy. 1989. Environmental Assessment for 881 Hillside (High Priority Sites), Interim Remedial Action, November 30, 1989 Draft Version, DOE/ERA 0413.

[2] Department of Energy. 1990. Draft Phase III RI/FS Work Plan - 881 Hillside Area, Rocky Flats Plant, Golden, Colorado. February, 1990.

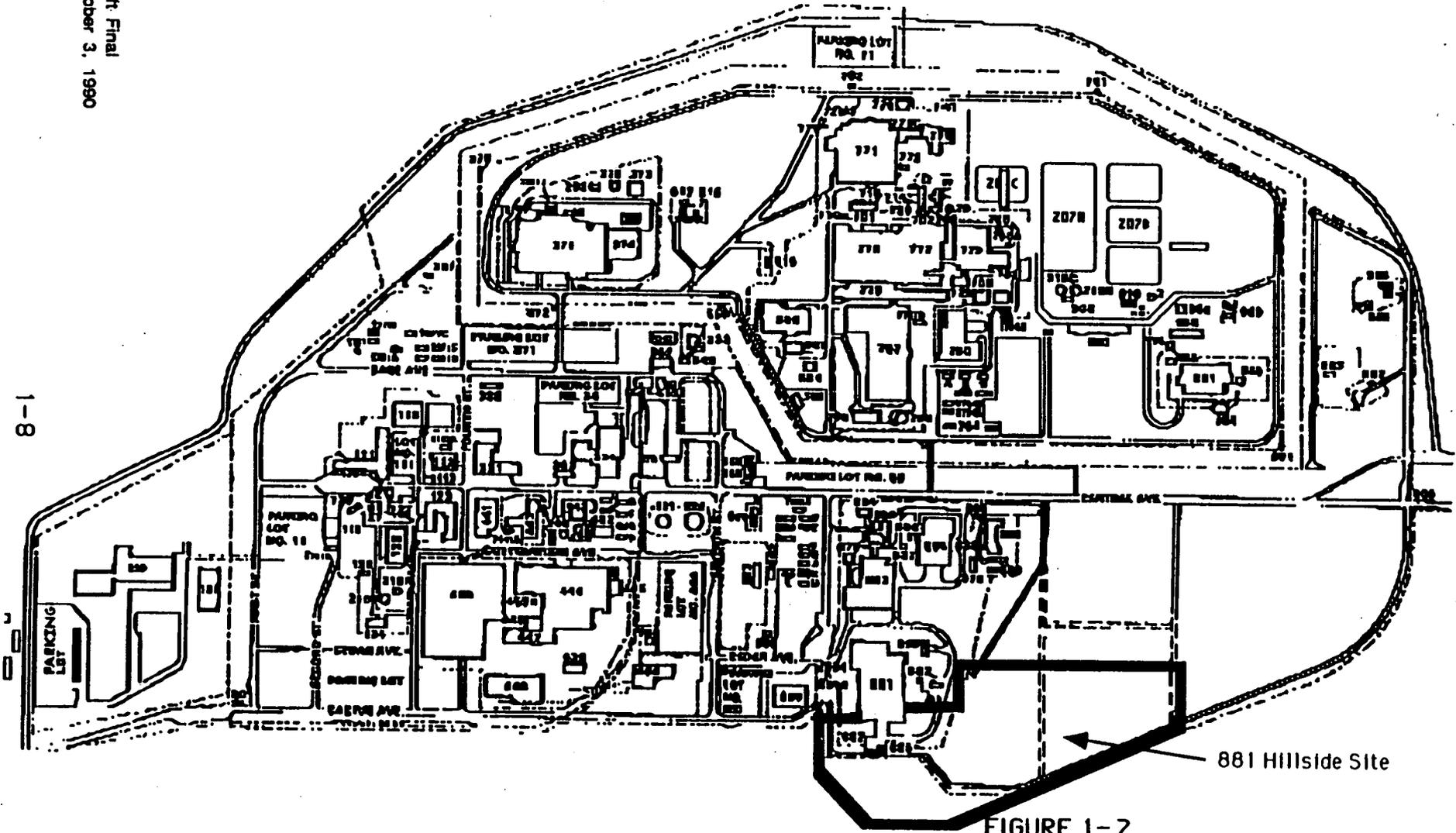


LEGEND:

 Solid Waste Management Unit

**Figure 1-1
Site Map
881 HILLSIDE (Operable Unit 1)**

1-8



↑ NORTH

FIGURE 1-2
881 HILLSIDE
AREA PLOT PLAN

2.0 HEALTH AND SAFETY RESPONSIBILITIES

2.1 Introduction

The 881 Hillside project (Operable Unit 1) is being managed by the Rocky Flats Plant Remediation Programs Department (RP), which reports to the Environmental Restoration Directorate (see Figure 2-1).

Rocky Flats Plant (RFP) Health and Safety Departments that support Environmental Restoration activities on the 881 Hillside include Occupational Safety, Radiological Engineering, Industrial Hygiene, Radiological Operations, Health & Safety Area Engineering, Fire Protection and Occupational Medicine. All of these departments are part of the Health & Safety Directorate. The health and safety organization chart for the 881 Hillside project is shown in Figure 2-2.

The Project Manager for the 881 Hillside has the overall responsibility for work performed at the site. The Project Manager through line management and supervisors has the responsibility for implementing and abiding by the Health and Safety Plan. The Environmental Restoration Health and Safety Officer with support from the Occupational Safety Department shall assist the Project Manager in coordinating the implementation of the Health and Safety Plan. Subcontractors shall implement their own approved Health and Safety Plan and shall be monitored by the Project Manager.

2.2 Assignment of Responsibilities

2.2.1 Division Managers

The Remediation Programs Department and Health and Safety Department Managers assist the respective program managers in the implementation of environmental and health and safety activities.

2.2.2 RP Project Manager

The RP Project Manager (PM) for the 881 Hillside has overall responsibility for the management of the project. The PM is responsible for preparing plans and procedures; implementing the Health & Safety Program; directing, controlling and reporting project activities; maintaining construction and health and safety documents; and communicating project requirements, including any modifications of the project scope, to the support organizations. The PM will also measure project progress, monitor the budget, evaluate project performance, ensure compliance with health and safety regulations and procedures, serve as a liaison with DOE/RFO (Department of Energy/Rocky Flats Office), EPA and CDH, and has stop work authority. The RP Project Manager reports directly to the RP Department Manager.

2.2.3 ER Health and Safety Officer

The ER Health and Safety Officer (ERHSO) has responsibility for assisting the Project Manager in implementing the ER Health and Safety program. Specific responsibilities include:

- o ensuring that a Site-Specific Health and Safety Plan is written for each Operable Unit;
- o ensuring that subcontractors submit site- or task-specific health and safety plans for approval;
- o ensuring that a Site Health and Safety Officer is assigned to each Operable Unit; and
- o ensuring that adequate safety support and review procedures are established so that site personnel are not at risk while working at the site.

In situations of noncompliance with health and safety requirements the ERHSO will consult with the project manager and initiate corrective actions through his authority. The ERHSO is assisted in his duties by the Health and Safety Liaison Officer.

2.2.4 H&S Liaison Officer

The H&S Liaison Officer is assigned from the Occupational Safety Department to serve as the central point-of-contact for supporting RP Projects with operational health and safety needs. The H&S Liaison Officer reports directly to the Occupational Safety Department Manager and interacts with the RP Project Manager and the ERHSO. The H&S Liaison Officer has the following responsibilities:

- o assisting project management
- o preparing EG&G Operable Unit Health and Safety Plans;
- o approving site-specific and task-specific Health and Safety Plans prepared by subcontractors;
- o appointing and supervising the Site Health and Safety Coordinator; and
- o performing periodic audits of the implementation of the site health and safety program and program documentation requirements.

2.2.5 Site Health and Safety Coordinator

The Site Health and Safety Coordinator (SHSC) will regularly monitor the implementation of the EG&G Operable Unit Health and Safety Plan (HSP). The SHSC reports to the H&S Liaison Officer and informs the ER Project Manager of the status of health and safety operations at the site. The SHSC has the following responsibilities:

- o monitoring the project to see that the requirements of the Environmental Restoration Health and Safety Program Plan and this HSP are followed;
- o coordinating with the H&S Liaison Officer regarding the need for additional safety support required at the 881 Hillside from supporting H&S divisions such as:

Occupational Safety, Industrial Hygiene, Health and Safety Engineering, Radiological Engineering, Radiological Operations, Occupational Health and Fire Protection;

- o performing audits of subcontractor health and safety operations;
- o alerting the RP Project Manager and the H&S Liaison Officer of health and safety violations; and
- o approving modified work practices in response to changing conditions at the 881 Hillside.

2.2.6 Health And Safety Area Engineer

The H&S Area Engineer is responsible for the management of a multi-discipline safety team. As the safety team leader, the H&S Area Engineer ensures effective communications within the H&S organization and with the Site Health and Safety Coordinator. In addition, the H & S Area Engineer will assist Operable Unit 1 management with the completion of Operational Safety Analyses and Job Safety Analyses.

2.2.7 Industrial Hygiene Representative

The Industrial Hygiene Representative is responsible for preparing and implementing the chemical monitoring program for EG&G employees working at the 881 Hillside. This includes initial evaluation of the site to ensure that levels of respiratory and clothing protection are adequate and generation of sufficient data upon which further PPE decisions can be based. In addition, the Industrial Hygiene Representative is responsible for addressing industrial hygiene complaints and concerns at the 881 Hillside and reviewing and approving all subcontractor sampling and monitoring plans.

2.2.8 Radiological Operations Area Manager

The Radiological Operations Area Manager has responsibility for providing qualified Radiation Protection Technologists (RPTs) to the 881 Hillside to implement the radiological monitoring program. RPTs will calibrate radiation monitoring equipment, conduct monitoring and will know the action levels for radiological contamination defined in this plan. RPT practices shall be in conformance with Radiological Operating Instructions (ROIs). RPTs will be responsible for notifying on-site supervision when action levels are approached or reached. RPTs are also responsible for clearing personnel and equipment to leave the 881 Hillside and documenting all monitoring results.

2.2.9 Radiological Engineering Representative

The Radiological Engineering Representative will define the requirements for radiation protection for the 881 Hillside as required by the Rocky Flats Radiation Control Program and DOE requirements. The Radiological Engineering Representative will define the protocols for monitoring, clothing, respiratory protection and decontamination for EG&G personnel in accordance with prudent health physics practices. Complaints and concerns about radiological hazards at the 881 Hillside will be addressed by the Radiological Engineer.

2.2.10 Occupational Health Director

The Occupational Health Director is responsible for the administration of the RFP Occupational Medical Program. These responsibilities include:

- o providing requisite physical examinations to EG&G employees working at hazardous waste sites;
- o maintaining all EG&G employee medical records;
- o correlating exposure data to ensure that the scope of annual physical examinations are correct; and

- o issuing letters to EG&G employees concerning potential exposures to hazardous materials based on bioassays.

2.2.11 Fire Protection Representative

The Fire Department is responsible for minimizing the potential for damage and injury to health and property as a result of fire or explosion. This is accomplished by ensuring that adequate fire suppression systems are available site-wide, that audits and inspections are conducted to abate potentially hazardous situations such as the improper storage of flammable or combustible materials, and to provide emergency support in the event of an injury or accident.

2.2.12 Subcontractor Health and Safety Officer

The subcontractor Health and Safety Officer is responsible for developing and implementing a Site-Specific Health and Safety Plan that adequately addresses the site hazards and controls necessary to safeguard personnel and property. Duties of the Subcontractor H&S Officer include:

- o ensuring that subcontractor personnel are adequately trained so that they can perform their assigned tasks safely;
- o ensuring that subcontractor personnel are aware of potential site hazards, and that they know the necessary controls to prevent overexposure or injury;
- o acting as or appointing a subcontractor H&S officer;
- o ensuring that the Health and Safety Plans and the required training and medical records for site personnel are current and are maintained on site; and
- o conducting the required monitoring or assuring that monitoring is conducted by the assigned personnel.

2.3 881 Hillside Personnel

Personnel assigned to the operational and support activities described above include:

ER 881 Hillside Project Manager

Jim Koffer

Extension 5949 / pager 1873

ER Health and Safety Officer

Dennis Smith

Extension 5958

Health and Safety Liaison Officer

Larry Grocki

Extension 2190 / pager 1654

Acting Site Health and Safety Coordinator

Larry Grocki

Extension 2190 / pager 1654

Health and Safety Area Engineers

D. Sund

Extension 2755

Industrial Hygiene Representative

Fred Kerchner

Extension 5823 / pager 2241

Radiological Operations Area Manager

E. English

Extension 4915 / pager 1506

Radiological Engineer Representative

Keith Anderson

Extension 5151 / pager 3296

Occupational Health Director

Dr. F.J. Furman

Extension 2895 / pager 2356

Fire Protection Representative

For Emergency Response Issues:

Tim Parker

Extension 4336

For Fire Protection Issues:

Bruce Campbell

Extension 7642 / pager 0023

EG&G ROCKY FLATS
ORGANIZATION

Draft Final
October 3, 1990

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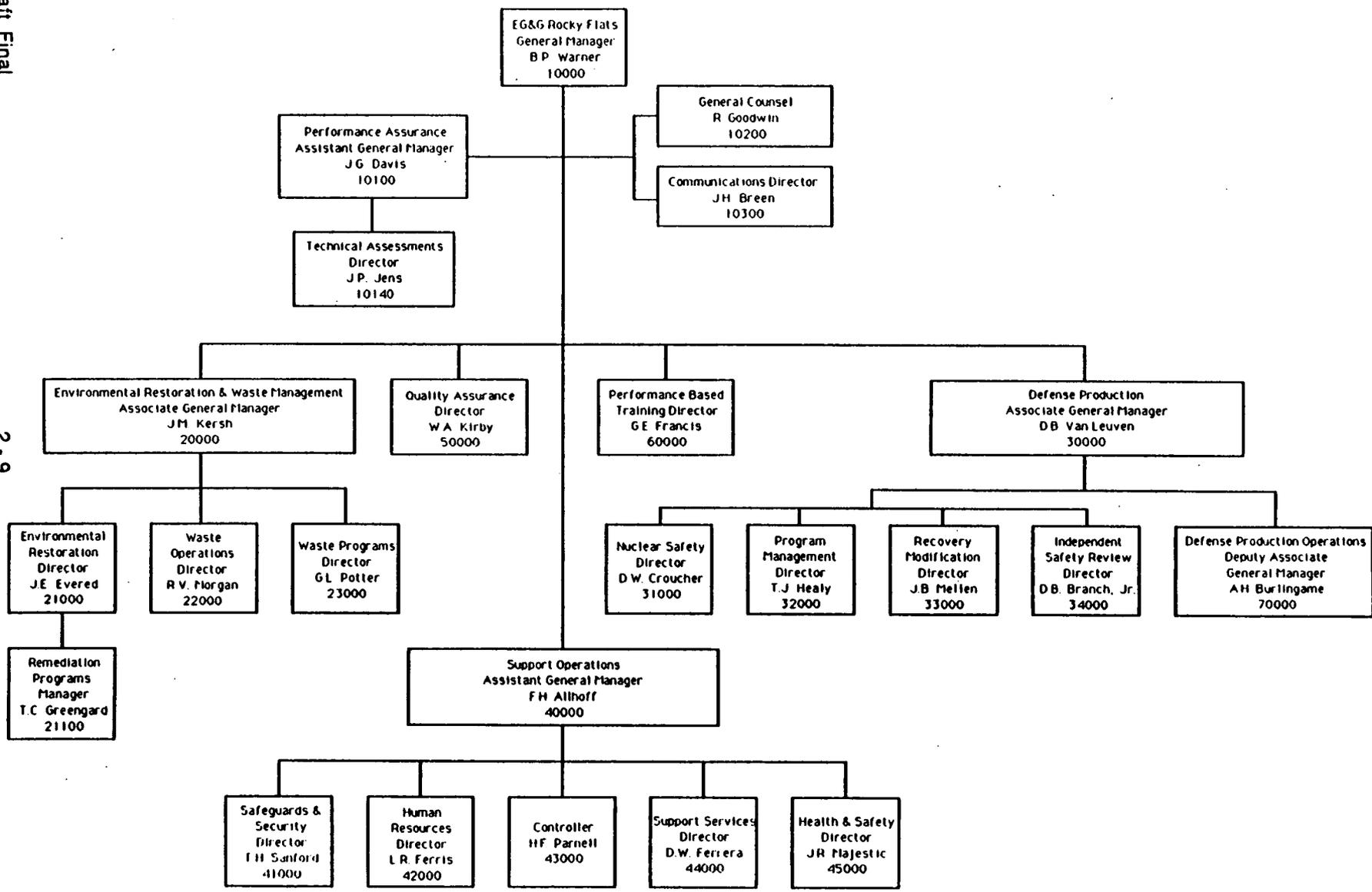
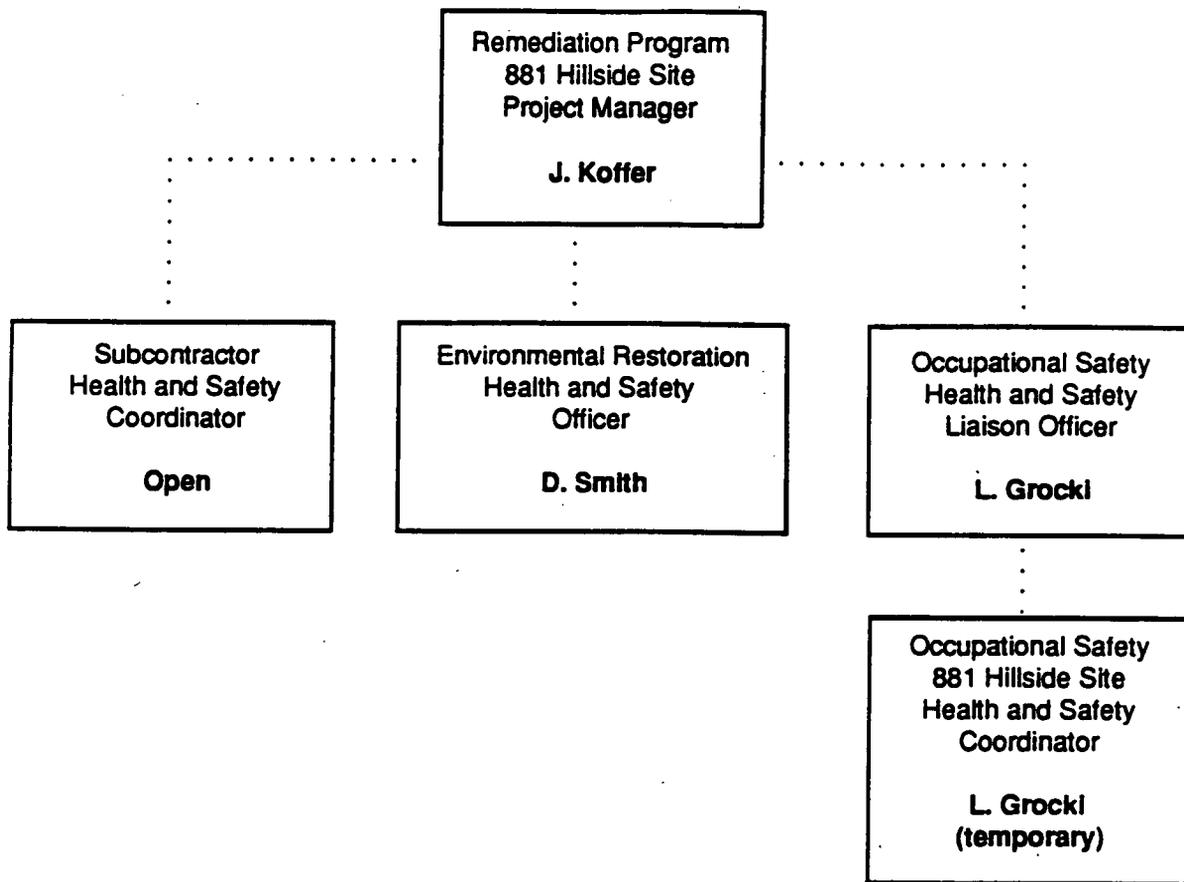


FIGURE 2-1

**FIGURE 2-2
HEALTH AND SAFETY ORGANIZATION FOR 881 HILLSIDE PROJECT**



ENVIRONMENTAL RESTORATION - 881 HILLSIDE HEALTH AND SAFETY SUPPORT TEAM					
Occupational Health Director	Fire Protection Representative	Radiological Operations Representative	Radiological Engineering Representative	Industrial Hygiene Representative	Health and Safety Engineering Representative
Dr. F.J. Furman	B. Cambell T. Parker	E. English	K. Anderson	F. Kerchner	D. Sund

3.0 HAZARD ASSESSMENT

3.1 Introduction

Potential chemical and radiological hazards that may be encountered during environmental restoration activities on 881 Hillside Area sites were identified by reviewing documents prepared during various phases of Remedial Investigation of the area. These documents provided information on the 881 Hillside site characterization and identified chemical and radiological contaminants in soils, groundwater, and surface water. Results of plant-wide air monitoring data was also included in these documents. Site characterization has been a continuous process designed to provide detail with respect to contaminant distribution and concentrations. Sources of contamination throughout the 881 Hillside Area are diverse, therefore, different levels of potential chemical or radiological hazards are expected for individual areas of the Hillside. Direct hazards, such as physical stresses, mechanical and other hazards, were assessed by reviewing documents that discussed preferred action alternatives, and anticipating the types of activities that might be involved in site restoration.

3.2 Chemical Contaminant Background Characterization

Soil contamination was determined by comparing site-specific sample data to a historic plant-wide study which determined typical background tolerance levels at RFP [1]. Materials unique to the 881 Hillside are also considered contaminants since similar compounds were not identified in background studies.

Surface water and groundwater contamination was determined by two methods: 1) by comparing sample data to Applicable or Relevant and Appropriate Requirements (ARARs) developed from State and Federal regulations (as required by the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization

Act of 1986 (SARA)) and, 2) review of other health affect assessments, chemical advisories, and guidance documents on materials "to be considered" although not covered by ARARs. These other identified materials are referred to as (TBCs) in this text and accompanying tables.

Contaminants covered by this Health and Safety Plan were the materials identified in soil samples obtained from shallow boreholes with concentrations that exceed background levels, and materials identified in groundwater monitoring wells that exceed ARARs or TBC values.

Contaminants of concern are listed in Tables 3-1 and 3-2, borehole sites and monitoring well locations are identified in Figure 3-1. Chemical data sheets for each identified contaminant are included as Appendix 3-1.

3.2.1 Soils

Soils have been analyzed for metals and volatile organic compounds during previous sampling operations at the site. Volatile organics identified include methylene chloride, acetone, phthalates, tetrachloroethylene, trichloroethylene, and 1,1,1-trichloroethane. Contamination is not extensive in soils; tetrachloroethylene, trichloroethylene, and 1,1,1-trichloroethane are the compounds found at the site in the highest concentrations.

Metal contamination at the 881 Hillside is generally within background levels. Trace metals that occurred above the background limits include antimony, arsenic, barium, cadmium, manganese, and mercury.

3.2.2 Groundwater

Groundwater at the 881 Hillside is present in alluvium, colluvium, valley fill alluvium, and weathered and unweathered bedrock. Groundwater quality is divided into two SWMU groups due to the historic activities conducted at the site. The first SWMU group (represented by surficial

and deep bedrock samples) includes the oil sludge pit (SWMU 102), chemical burial site (SWMU 103), out-of-service fuel tank site (SWMU 105.1), out-of-service fuel tank site (SWMU 105.2), outfall site (SWMU 106), hillside oil leak site (SWMU 107), sanitary waste line leak site (SWMU 145), and Building 885 drum storage site (SWMU 177). Figure 3-2 shows the location of the SWMUs included with this group. The second SWMU group (represented by unconfined flow system samples) consists of the western-most multiple solvent spill site (SWMU 119.1), the eastern-most multiple solvent spill site (SWMU 119.2), and radioactive site - 800 Area Site #1 (SWMU 130). These SWMUs are identified in Figure 1-1.

3.2.2.1 Surficial and Deep Bedrock Samples

Groundwater quality in the area of the first SWMU group was analyzed from data collected during two sampling programs in 1989. The first samples were collected from ten monitoring wells which were constructed in surficial materials in proximity of, or downgradient from the SWMU sites; the second samples were collected from unweathered bedrock located downgradient of the SWMU group.

Both volatile organic and inorganic contamination is present in the surficial well samples. Volatile organics were detected above the analytical detection limits. Inorganic contaminants include bicarbonate, calcium, chloride, magnesium, manganese, nitrate, selenium, sodium, strontium, sulfate, zinc, and total dissolved solids.

The deep bedrock samples indicate that groundwater in this SWMU group is not contaminated. No volatile organic contamination was identified and metals contamination was slightly above background levels. Dissolved metals identified include barium, lithium, manganese, nickel, and total dissolved solids.

3.2.2.2 Unconfined Flow System Samples

Data for the second SWMU group was obtained from thirteen monitoring wells constructed in the unconfined flow system downgradient from the sites (see Figure 3-1).

Data from several wells show organic contaminants including carbon tetrachloride, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, 1,1,2-trichloroethane, 1,1,1-trichloroethane, methylene chloride, and trichloroethylene [2]. It appears that volatile organic contamination in the colluvial groundwater is limited to the area downgradient of the westernmost multiple solvent spill site (SWMU 119.1).

Inorganic analysis of samples from several wells identified levels which significantly exceed the background limits. Materials identified include calcium, chloride, magnesium, nitrate, sodium, sulfate, and total dissolved solids. Metals detected above background limits include aluminum, arsenic, barium, cadmium, chromium, copper, iron, lead, lithium, magnesium, nickel, potassium, selenium, sodium, strontium, and zinc.

3.2.3 Surface Water

Surface water quality was analyzed for volatile organics, inorganics, and radiochemistry during the period of March to June 1989. The data was collected from nine surface water sampling stations located along the South Interceptor Ditch, Woman Creek, and at various seeps and ponds in the 881 Hillside Area.

Volatile organics were detected in samples from the Building 881 foundation drain and the pond formed by groundwater seepage. No volatile organics were detected in samples taken from the discharge to the Interceptor Ditch. Inorganics detected include total dissolved solids, nitrate, and sulfate. Metals detected include aluminum, beryllium, cadmium, chromium, copper,

mercury, selenium, sodium, and zinc. In Woman Creek, volatile organics were not detected, inorganics were within tolerance interval values, and only zinc was detected at levels greater than background levels.

3.2.4 Sediments

Bedload sediment samples were collected downgradient of the 881 Hillside Area during the 1989 site characterization study. The sediment sample stations are also hydraulically downgradient of the 903 Pad Area and may also reflect this source. No volatile organic compounds were present above detection limits in sediment samples except for acetone, which was also present in the laboratory blank and not a likely sediment contaminant at this location. Beryllium, silver, and tin concentrations were notably elevated above background levels.

3.2.5 Air

Nonradioactive ambient air quality monitoring for criteria pollutants at the Rocky Flats Plant has been performed continuously for several years at a site near the east facility boundary. 1988 monitoring data demonstrated compliance with all National Ambient Air Quality Standards.

3.3 Chemical Hazards

3.3.1 Pathways and exposure routes

Pathways of exposure to chemical hazards are directly dependent on activities involved in the remedial action. These actions include the collection of contaminated alluvial groundwater for treatment. Three collection points are planned: a collection well constructed to remove contaminated groundwater for treatment, a foundation outfall sump at the existing foundation drain (SWMU 107), and a french drain constructed across the base of the 881 Hillside Area.

The contaminated water will be pumped to a newly constructed treatment facility, which destroys organic contaminants by ultraviolet light, hydrogen peroxide oxidation, and removes radionuclides and inorganic contaminants in stages by ion exchange. Regenerant wastes from non-radioactive ion exchange resins will be sent to Building 374 for final treatment. Treatment plant effluent will meet all chemical-specific ARARs [3], and will be reintroduced to the alluvial via a re-injection system located downgradient of the french drain.

In addition to the activities directly related to the proposed action, other remediation will be undertaken for restoration of the SWMU sites. Since characterization of the sites was based on limited samples, continued sampling planned under interim remedial action will provide more detail on the presence and concentrations of contaminants to which workers may be exposed.

Workers involved in environmental restoration activities, construction of collection facilities, and operation of the facilities associated with the remedial action at the 881 Hillside Area may be exposed to chemical hazards through three pathways:

- o inhalation exposures to volatile organic chemicals and metal contamination in the vicinity of excavations or soil stockpiles, within excavated trenches or holes, or within the water treatment facility,
- o skin exposures, or
- o inadvertent ingestion of low-volatility organic chemicals or fugitive dust contaminated with metals.

Airborne exposures to volatile organic chemicals

Low levels of volatile organic chemicals were detected in alluvial groundwater samples in the vicinity of the proposed french drain while concentrations in soil samples were found not to be significant. Normal construction activities and shallow trenching in unsaturated soils should not release volatile organic chemicals. Methylene chloride and acetone were detected at low levels in groundwater, but may have been laboratory contaminants; therefore, workers at the french drain construction site are not likely to be exposed to significant levels of organic compounds released from water seeping into the excavation.

Exposure to organic chemicals around unconfined excavations or soil stockpiles are expected to be minimal, since these sources are unconfined and organic concentrations are low. Soils exposed during drilling of the new source well will be damp and unconfined, therefore organic chemical vapor inhalation is expected to be well within the allowable limits .

Personnel could be exposed to low concentrations of volatile organics during routine operation and maintenance of the water treatment facility. Normal exposure routes to vapors would be from sampling or maintenance, or from system leaks. Yet, since the process is a closed system, in which the UV/peroxide process destroys rather than concentrates the contaminants, it is not expected that workers would be exposed to volatile organic compounds in the treated water.

Skin exposures to low-volatility organic chemicals

Measurable levels of low-volatility organic chemicals have been identified in soil samples at the 881 Hillside Area. Their presence could lead to dermal exposures to workers during excavations for the collection system, including the french drain, and during the installation of the new source well. Dermal exposure to liquids in the operation of the water treatment facility may occur during sampling or maintenance or from system leaks.

Inadvertent ingestion of contaminants

Workers may be exposed to hazardous chemicals or radioactive materials through inadvertent ingestion of contaminated soil during construction or site restoration activities. Bis-(2-ethylhexyl)phthalate is the only low-volatility organic chemical found in the 881 Hillside Area soil. None of the metals detected poses a carcinogenic risk through the ingestion pathway.

3.4 Radiological Contaminant Background Characterization

3.4.1 Soils

Plutonium was detected above background levels only in surface soils during a sampling program conducted early in 1990 [7] (see Table 3-3). Data from surface scrape samples taken in 1988 also indicate that there is radionuclide surface contamination in the 881 Hillside Area. The locations where surface scrape samples were obtained are shown on Figure 3-3 and the results of this additional survey are shown in Table 3-4. In this study, the highest plutonium concentration detected was 4.8 ± 0.5 pCi/g (sample 881-3), the highest uranium (U-233 and U-234) concentration detected was 60 ± 230 pCi/g, and the highest uranium-238 value was 3000 ± 300 pCi/g (sample 881-18).

Plutonium concentrations are typical of surface concentrations in this vicinity and to the east within the Plant boundary [4]. Uranium, cesium, and tritium occur infrequently above background and at depths below the surface. None of these radionuclides were present above background by more than a factor of two above the upper tolerance interval. The uranium-233 + 234 to uranium-238 activity ratios are greater than one, which indicates that the uranium is natural. Cesium-137 is presumed to be due to atmospheric fallout from historic global weapons testing. In summary, radionuclide concentrations may represent natural variations outside the background tolerance intervals [2].

3.4.2 Groundwater

Uranium-233 + 234, uranium-235, and uranium-238 were measured above background in groundwater samples taken in the vicinity of the first group of SWMUs.

3.4.3 Surface Water and Sediments

Uranium was the only radionuclide detected above background in South Interceptor Ditch surface water stations downstream from the 881 Hillside Area. Plutonium was also found above background in four sediment sample stations.

3.4.4 Air

The 903 Pad Area, east-northeast of 881 Hillside, is recognized as the principal source of airborne plutonium contamination at the plant. Air samplers for routine ambient air monitoring of radionuclides are situated at 51 locations on and off the plant site. Historically, particulate samplers located immediately east, southeast, and northeast of the 903 Pad, Mound, and East Trenches have shown the highest plutonium concentrations. However, the Plant Radioactive Ambient Air Monitoring Program has found ambient air samples to be well within applicable regulations and guidelines for the protection of human health and the environment for all radioactive contaminants [4].

3.5 Radiological Hazards

3.5.1 Pathways and exposure routes

Workers involved in environmental restoration activities and construction and operation of collection and treatment facilities associated with the remedial action at the 881 Hillside Area

could be exposed to radiological hazards through inhalation and ingestion pathways. Radioactive materials are not readily absorbed through the skin, so they do not present a risk to workers through contact. Important pathways are:

- o inhalation exposure to fugitive dust contaminated with radioactive materials, and
- o inadvertent ingestion of fugitive dust contaminated with radioactive materials.

Inhalation or ingestion exposure to fugitive dust contaminated with radioactive materials

Workers could be exposed through inhalation or inadvertent ingestion of fugitive dust contaminated with radioactive materials during excavation and construction activities, if these surface soils were to be disturbed without appropriate precautions during operations performed when weather conditions could cause dust entrainment into the atmosphere.

Potential exposures from contact with radioactive contaminants during the operation of the treatment facility are minimal since the uranium removal unit will not be regenerated, but will be shipped off site for disposal.

3.6 Summary of Chemical and Radiological Hazards

The presence of chemical and radiological hazards for each individual SWMU is based on data from characterization surveys. More specific sampling for each SWMU has been proposed in interim remedial action plans. The hazards identified are therefore subject to revision as a result of further surveys.

Oil Sludge Pit (SWMU 102)

Isolated detections of tetrachloroethylene were found in the soil gas survey and phthalates have been found in soils.

Chemical Burial Site (SWMU 103)

Tetrachloroethylene was detected in soil gas and soil samples contained 2-butanone and phthalates.

Liquid Dumping Site (SWMU 104)

This site may be the same location as SWMU 103. No evidence of this area was found in review of historical aerial photographs or in field investigations.

Out-of-service Fuel Tanks (SWMU 105.1 and 105.2)

No evidence of contamination has been found near the tanks and they have been removed from consideration as potential sources of contamination.

Sanitary Sewer Outfall (SWMU 106)

Soils in the vicinity were found to contain methylene chloride, acetone, 2-butanone, and phthalates.

Hillside Oil Leak (SWMU 107)

The source of the oil from the Building 881 footing drain was never positively identified. The oil was collected in a skimming pond and transported off site. Tetrachloroethylene, 1,1,1-trichloroethane, trichloroethylene, and dichloroethylene were detected in soil gas in the vicinity.

Multiple Solvent Spill Sites (SWMU 119.1 and 119.2)

Tetrachloroethylene and trichloroethylene were found in soil gas samples. Several volatile organic compounds and phthalates were found in soils near the sites.

Radioactive Site - 800 Area #1 (SWMU 130)

An area east of Building 881 was used between 1969 and 1972 to dispose of Pu-contaminated soil and asphalt. The materials deposited at this site came from three sources: Pu-contaminated soil and asphalt from the 1969 fire in Building 776, a section of Central Avenue contaminated by a leaking drum in 1968, and Pu-contaminated soil from the vicinity of Building 774 process waste tanks in 1972. Material from the 1969 fire was buried under 1 to 2 ft of fill dirt, and the contaminated soil from the third source was placed on top of previously deposited soils and covered with approximately 3 ft of fill dirt. Methylene chloride and bis(2-ethylhexyl)phthalate were found in soil samples.

Sanitary Waste Line Leak (SWMU 145)

The line conveyed sanitary wastes to the sanitary treatment plant and did not carry hazardous or radioactive materials. The site has been removed from consideration.

Building 885 Drum Storage Site (SWMU 177)

Building 885, immediately south of Building 881, is currently used for satellite collection and 90-day accumulation of RCRA regulated wastes. The building will be closed under RCRA Interim Status (Code of Federal Regulations #40, Part 265 (40 CFR 265)). Complete information on this solid waste management unit is provided in the Resource Conservation Recovery Act (RCRA) Interim Status Closure Plan, which is appended to the revised Post-Closure Care Permit Application for hazardous and radioactive mixed wastes at the Rocky Flats Plant. Any groundwater contamination from this site will be addressed by the remedial action as stated in the Remedial Action Plan/ Environmental Assessment for Operable Unit No. 1 [2].

3.7 Physical Stresses

Workers on sites within the 881 Hillside Area are potentially subjected to physical stresses including heat and cold stress and noise exposure. Restoration operations may take place during a wide range of weather conditions. Workers using impermeable clothing during warm weather are susceptible to heat stress.

3.7.1 Cold Exposure

When working outdoors in temperatures below freezing, workers are susceptible to frostbite. Exposure to extreme cold can cause severe injury to the body surface or can result in profound generalized cooling, causing death. In cold weather, precautions should be taken to prevent cold exposure by wearing properly insulated garments and taking warm-up breaks when necessary. Symptoms of cold exposure are:

- o incipient frostbite or frost nip, characterized by sudden blanching or whitening of the skin,

- o superficial frostbite, which causes the skin to become waxy or white and superficially firm, but resilient beneath,
- o deep frostbite, characterized by cold, pale, solid skin tissues, and
- o systemic hypothermia, caused by exposure to freezing or rapidly dropping temperature. Symptoms are usually exhibited in five stages including shivering, apathy, listlessness, sleepiness and rapid cooling of the body temperature to less than 95°F, unconsciousness, glassy stare, slow pulse and slow respiratory rate, freezing of the extremities, and death.

3.7.2 Heat Stress

A worker's risk for developing heat stress is greatly increased when wearing impermeable clothing. This type of clothing limits the body's normal heat exchange mechanisms and increases energy expenditure. Heat stress can cause health effects that range from heat fatigue to serious illness or death. Signs and symptoms of heat stress are:

- o heat rash, that may result from continuous exposure to heat or humid air,
- o heat cramps, caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include muscle spasms, or pain in hands, feet or abdomen,
- o heat exhaustion, that occurs from increased stress on various body organs or systems including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; or fainting.

- o heat stroke, which is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are: red, hot, usually dry skin; lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse; or coma.

3.7.3 Noise Exposure

Workers will be exposed to noise during restoration activities at the 881 Hillside Area from excavation and hauling equipment, compressors, pumps, air hammers, and other noise sources. Noise exposure shall be controlled to levels below those stipulated in Table 3-5 or adequate hearing protection shall be required for all exposed personnel. Industrial Hygiene shall be responsible for compliance with ACGIH recommended levels [6].

3.8 Mechanical Hazards

Workers may be exposed to potential mechanical hazards during the restoration activities on 881 Hillside Area sites. Hazards and methods of hazard control are detailed in Standard Operating Procedures (SOPs), and Operation Safety Analyses (OSAs) for specific tasks performed during restoration activities. Applicable SOPs and OSAs, shall be provided by Environmental Restoration for each anticipated task. Periodic on-site inspections will be conducted regularly to assess hazards according to Health and Safety protocols.

TABLE 3-2

CHEMICAL SPECIFIC ARARs FOR COMPOUNDS
AND ELEMENTS DETECTED AT THE 881 HILLSIDE AREA*

Chemical	Maximum In 881 Hillside Area Alluvial Ground Water(a)	ARAR (µg/l)	Detection Limit (µg/l)	Standard Criteria or Guidance	Comment
Organic Compounds					
Carbon Tetrachloride	2400J	5	5	CDH Surface Water; Drinking Water Standard is applicable	ARAR is exceeded
1,1 Dichloroethane	180J	5U	5	RCRA Subpart F, Appendix IX Substance is TBC	TBC is exceeded
1,2 Dichloroethane	17J	5	5	CDH Surface Water; Drinking Water Standard is applicable	ARAR is exceeded
1,1 Dichloroethene	7900J	7	5	CDH Surface Water; Drinking Water Standard is applicable	ARAR is exceeded
Methylene Chloride	17B	5U	5	RCRA Subpart F is R&A	ARAR is exceeded
Tetrachloroethene	5900J	10	5**	CDH Surface Water; Fish and Water Ingestion Standard is applicable	ARAR is exceeded
1,1,1 Trichloroethane	15000	200	5	CDH Surface Water; Drinking Water Standard is applicable	ARAR is exceeded
1,1,2 Trichloroethane	47J	10	5**	CDH Surface Water; Fish and Water Ingestion Standard is applicable	ARAR is exceeded
Trichloroethene	11000	5	5	CDH Surface Water; Drinking Water Standard is applicable	ARAR is exceeded
Metals					
Chemical	Maximum In 881 Hillside Area Alluvial Ground Water(a)	ARAR (µg/l)	Detection Limit (mg/l)	Standard Criteria or Guidance	Comment
Antimony	0.0798	0.06U	0.06	RCRA Subpart F is R&A	ARAR is exceeded
Calcium	355.99	NS	5	No Standard	No comments
Cesium	0.04J	NS	1	No Standard	Background is TBC
Chromium III	0.0782	0.05	0.01	CDH Surface Water; Drinking Water Standard is applicable	Analytical result is total chromium ARAR may be exceeded

TABLE 3-2 (Pg 2 of 3)

CHEMICAL SPECIFIC ARARs FOR COMPOUNDS
AND ELEMENTS DETECTED AT THE 881 HILLSIDE AREA*

Chemical	Maximum In 881 Hillside Area Alluvial Ground Water(a)	ARAR (µg/l)	Detection Limit (mg/l)	Standard Criteria or Guidance	Comment
Metals (Con't)					
Chromium VI	0.0782	0.05	0.01	CDH Surface Water; Drinking Water Standard is applicable	
Copper	0.9515	0.2	0.025	CDH Surface Water; Drinking Water Standard is applicable	ARAR is exceeded
Iron	0.4065	0.3	0.1	CDH Surface Water; Drinking Water Standard is applicable	Analytical results are total soluble iron; soluble iron exceeds ARAR
Manganese	0.9586	0.05	0.015	CDH Surface Water; Drinking Water Standard is applicable	Analytical results are total soluble manganese; soluble manganese exceeds ARAR
Mercury	0.9	0.002	0.0002	CDH Surface Water; Drinking Water Standard is applicable	ARAR is exceeded
Nickel	1.1827	0.2	0.04	CDH Agriculture Standard is applicable	ARAR is exceeded
Selenium	3.2	0.01	0.005	CDH Surface Water; Drinking Water Standard is applicable	ARAR is exceeded
Strontium	2.9068	NS	0.2	No Standard	Background is TBC
Thallium	0.01	0.01U	0.01	RCRA Subpart F is R&A	ARAR is exceeded
Zinc	2.4559	2	0.02	CDH Agriculture Standard is applicable	ARAR is exceeded
Conventional Pollutants					
pH	5.6 - 8.5	6.5 - 9.0	0.1	CDH Ground Water Standard is applicable	ARAR is exceeded
Nitrate	55	10	5	CDH Ground Water Standard is applicable	Analytical results are total nitrate nitrogen Results indicate that nitrate ARAR is exceeded

TABLE 3-2 (Pg 3 of 3)

**CHEMICAL SPECIFIC ARARs FOR COMPOUNDS
AND ELEMENTS DETECTED AT THE 881 HILLSIDE AREA***

Chemical	Maximum In 881 Hillside Area Alluvial Ground Water(a)	ARAR (µg/l)	Detection Limit (mg/l)	Standard Criteria or Guidance	Comment
Conventional Pollutants Con't)					
Chloride	838	250	5	CDH Ground Water Standard Is applicable	ARAR is exceeded
Sulfate	700	250	5	CDH Ground Water Standard Is applicable	ARAR is exceeded
T.D.S.	2374	400	5	CDH Ground Water Standard Is applicable	ARAR is exceeded
Chemical	Maximum In 881 Hillside Area Alluvial Ground Water(a)	ARAR (µg/l)	Detection Limit (pCi/l)	Standard Criteria or Guidance	Comment
Radionuclides					
Gross Alpha	319	7	2	CDH Surface Water Standard Is applicable	ARAR is exceeded
Gross Beta	288	5	4	CDH Surface Water Standard Is applicable	ARAR is exceeded
Pu238, 239,240	<0.01(c)	0.05	0.01	CDH Surface Water Standard Is applicable	ARAR is NOT exceeded
Am241	<0.01(c)	0.05	0.01	CDH Surface Water Standard Is applicable	ARAR is NOT exceeded
H3	777	500	400	CDH Surface Water Standard Is applicable	ARAR is exceeded
Sr89, 90	5.6	8	1	CDH Surface Water Standard Is applicable	ARAR is NOT exceeded
Uranium-Total	58.9	5	1.8	CDH Surface Water Standard Is applicable	ARAR is exceeded
Notes:					
(a) - Maximum compound concentrations determined from first and second quarter 1989 data.					
(b) - Maximum compound concentrations determined from 1987 and 1988 data base.					
(c) - Below minimum detectable activity (MDA)					
U - Detection limit					
J - Estimated below detection limit					
B - Compound also present in blank					
TBC - To be considered					
* - Reference [2]					
** - Detection limit exceeds ARARs					

TABLE 3-3

Results of Soil Sampling Program - 891 Building Site, 1st Quarter 1990 [7]

<u>Sample Number</u>	<u>Surface Characteristic</u>	<u>Pu-239 dpm/gr</u>	<u>Pu-239 pCi/gr</u>
1	Grass	1.621	0.73
2	Grass	1.818	0.82
3	Scraped Soils	0.274	0.12
4	Roughened Soils	2.663	1.20
5	Roughened Soils	4.056	1.83
6	Scraped Soils	0.487	0.22
7	Subsurface Soils (excavated area)	0.107	0.05
8	Scraped Soils	0.429	0.19

TABLE 3-4

881 HILLSIDE 1988 SURFACE SCRAPE SAMPLING RESULTS¹

RADIONUCLIDE CONCENTRATION IN pCi/g

<u>Sample #</u>	<u>SWMU #</u>	<u>Uranium-233+234</u>	<u>Uranium-238</u>	<u>Plutonium</u>
881-1	119.2	0.56±0.26	0.6±0.15	4.3±0.5
881-2	119.2	0.78±0.26	0.86±0.15	2.4±0.2
881-3	119.2	0.82±0.26	0.91±0.15	4.8±0.5
881-4	119.1	1.0±0.3	0.97±0.2	0.18±0.006
881-5	119.1	0.86±0.26	0.88±0.15	0.59±0.008
881-6	119.2	1.5±0.3	5.5±0.5	2.2±0.2
881-7	104/130	0.74±0.26	0.75±0.15	0.63±0.09
881-8	Note 2	0.86±0.26	0.82±0.15	1.8±0.2
881-9	103	3.1±0.3	1.0±0.2	0.47±0.006
881-10	Note 3	1.1±0.3	0.98±0.2	3.5±0.4
881-11	Note 3	1.0±0.3	1.3±0.2	2.6±0.3
881-12	Note 4	0.93±0.26	1.4±0.2	0.4±0.06
881-13	Note 4	0.94±0.26	1.3±0.2	0.16±0.06
881-14	Note 5	1.1±0.3	1.0±0.2	3.0±0.4
881-15	107	2.0±0.3	1.5±0.16	0.01±0.06
881-16	119.1	50±190	1300±100	0.3±0.06
881-17	119.1	19±74	590±70	0.78±0.19
881-18	119.1	60±230	3000±300	0.42±0.08
881-19	119.1	10±740	550±60	0.09±0.06

Notes:

1. Source: Draft Phase III Workplan - 881 Hillside Area
2. Sample located northwest of SWMU 104
3. Sample located between SWMUs 119.1 and 119.2
4. Sample located southwest of SWMU 119.1
5. Sample located between SWMUs 102 and 103

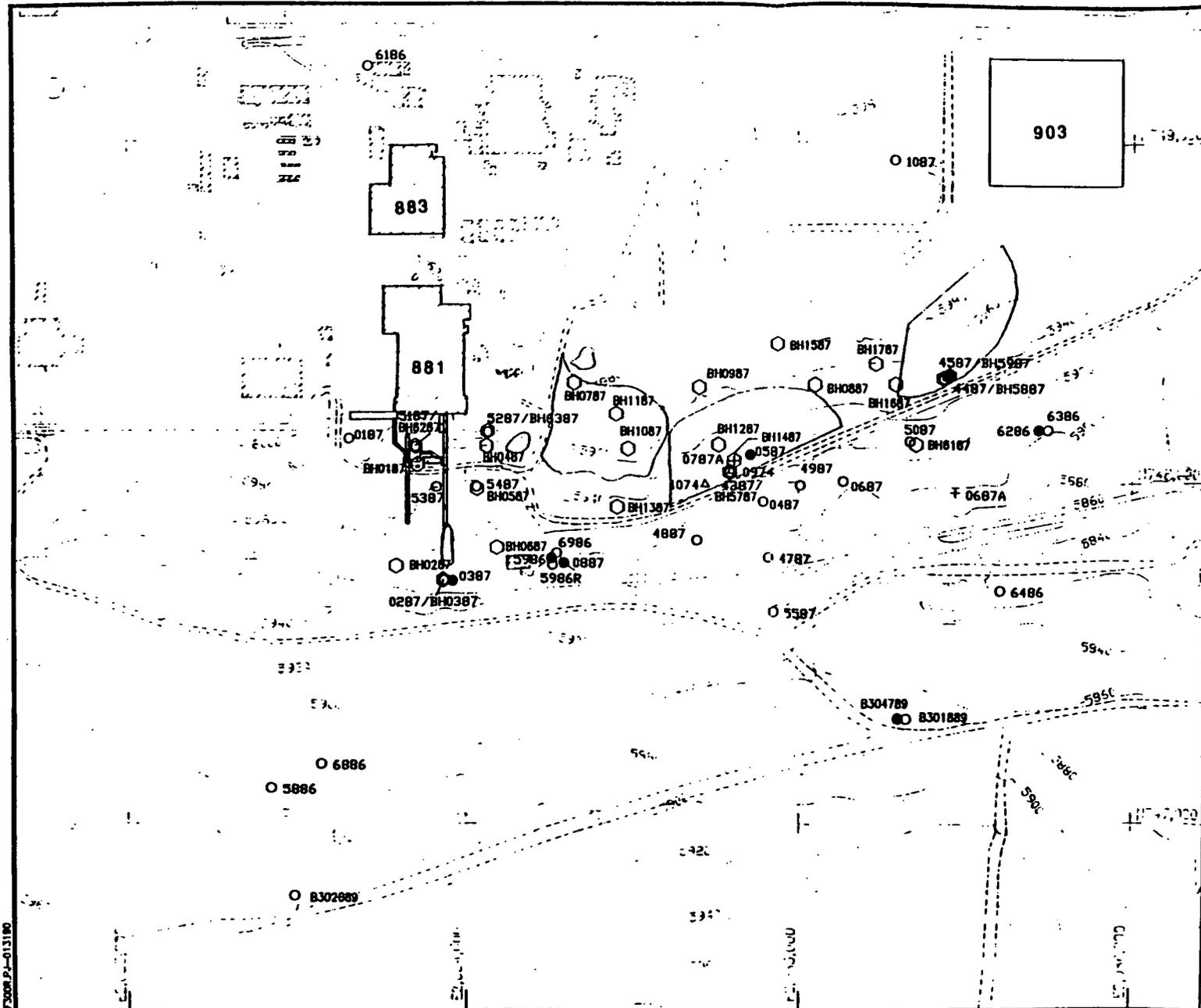
Table 3-5
THRESHOLD LIMIT VALUES FOR NOISE¹

Duration per Day Hours	Sound Level dBA ²
16	80
8	85
4	90
2	95
1	100
1/2	105
1/4	110
1/8	115 ³

1. From "Threshold Limit Values and Biological Exposure Indices for 1989-1990". American Conference of Governmental Industrial Hygienists. Cincinnati, Ohio.
2. Sound level in decibels are measured on a sound meter, conforming as a minimum to the requirements of the American National Standards Specification for Sound Level Meters, S1.4 (1971 Type S2A, and set to use the A-weighted network with slow meter response).
3. No exposure to continuous or intermittent in excess of 115 dBA.

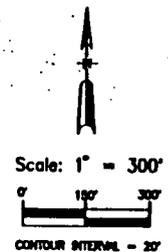
FIGURE 3-1 (881 Hillside HSP)

3-24



EXPLANATION

- Solid Waste Management Unit (SWMU)
- B301889 ○ Alluvial Monitoring Well
- B304789 ● Bedrock Monitoring Well
- 0271 △ Pre-1986 Well
- 1187A + Abandoned Hole
- BH0987 ○ Borehole



U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden, Colorado

OPERABLE UNIT NO.1
PHASE III RI/FS WORK PLAN

PHASE I AND PHASE II RI
BOREHOLE AND MONITOR WELL
LOCATIONS

February, 1990

B0110-0006

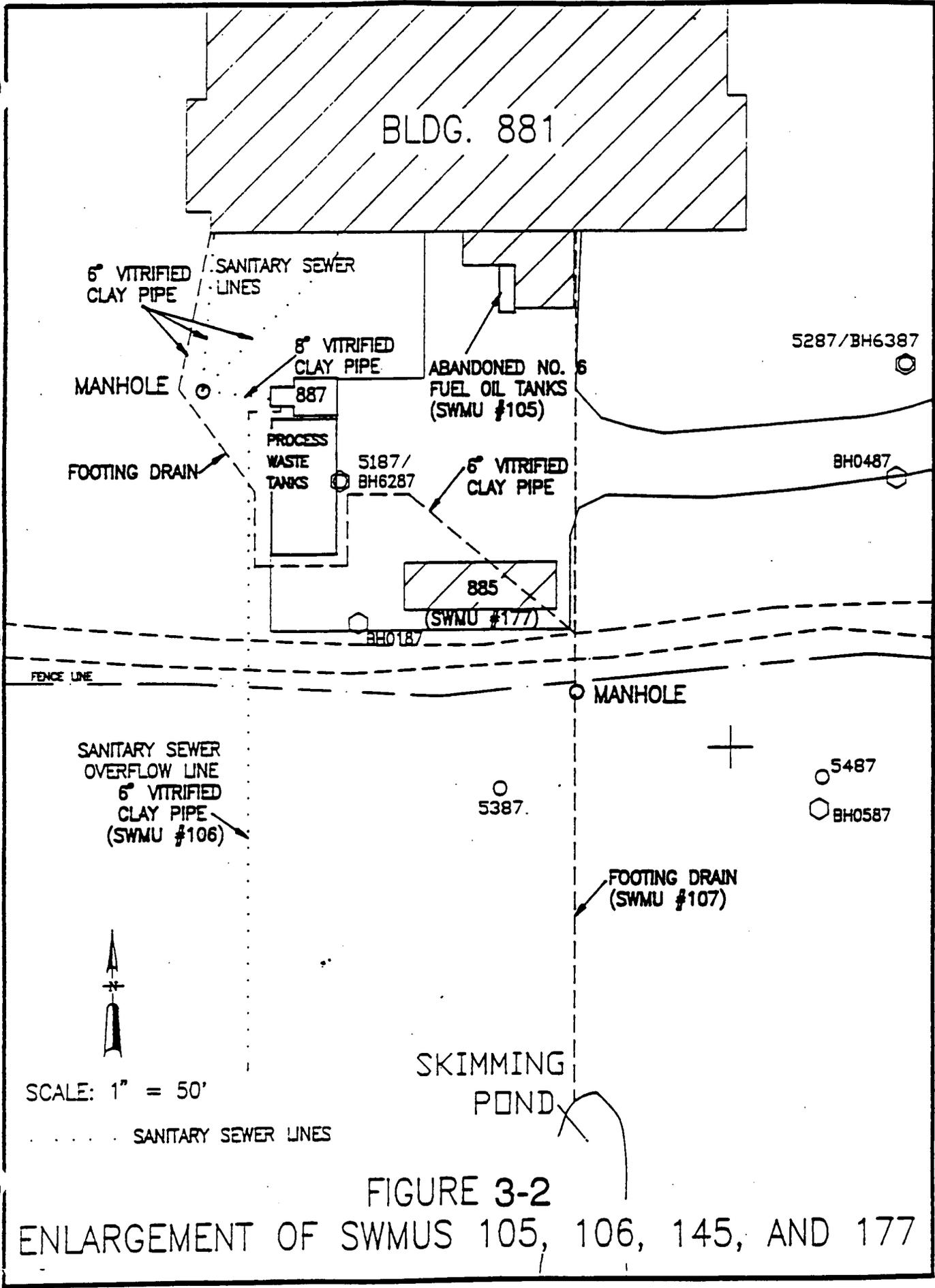
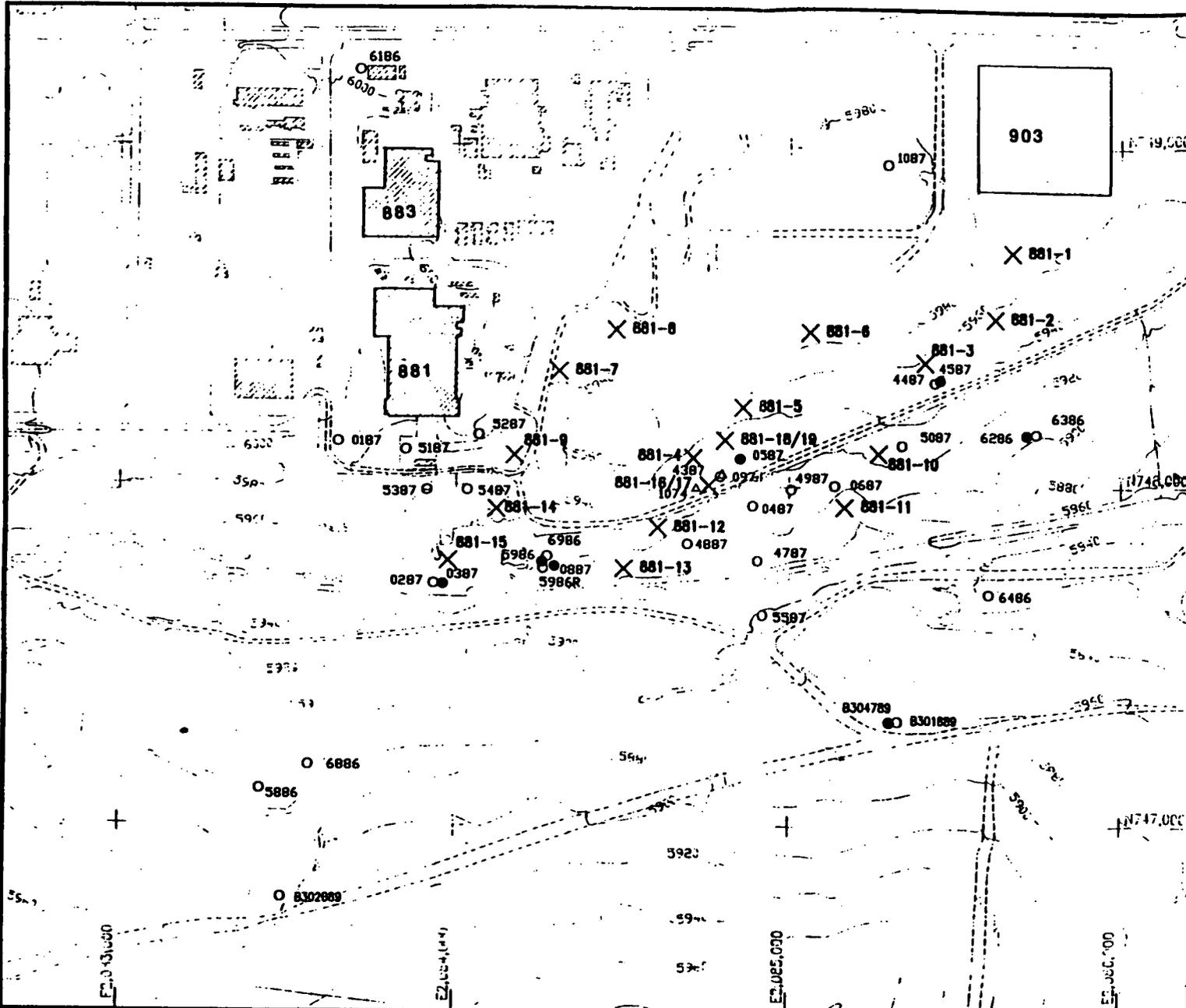


FIGURE 3-2
 ENLARGEMENT OF SWMUS 105, 106, 145, AND 177

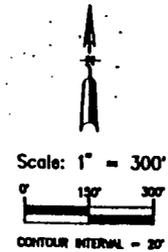
FIGURE 3-3 (881 Hillside HSP)

3-26



EXPLANATION

- 8301889 ○ Alluvial Monitoring Well
- 8304789 ● Bedrock Monitoring Well
- 0271 △ Pre-1986 Well
- × 881-1 Approximate Surface Soil Scrape Location



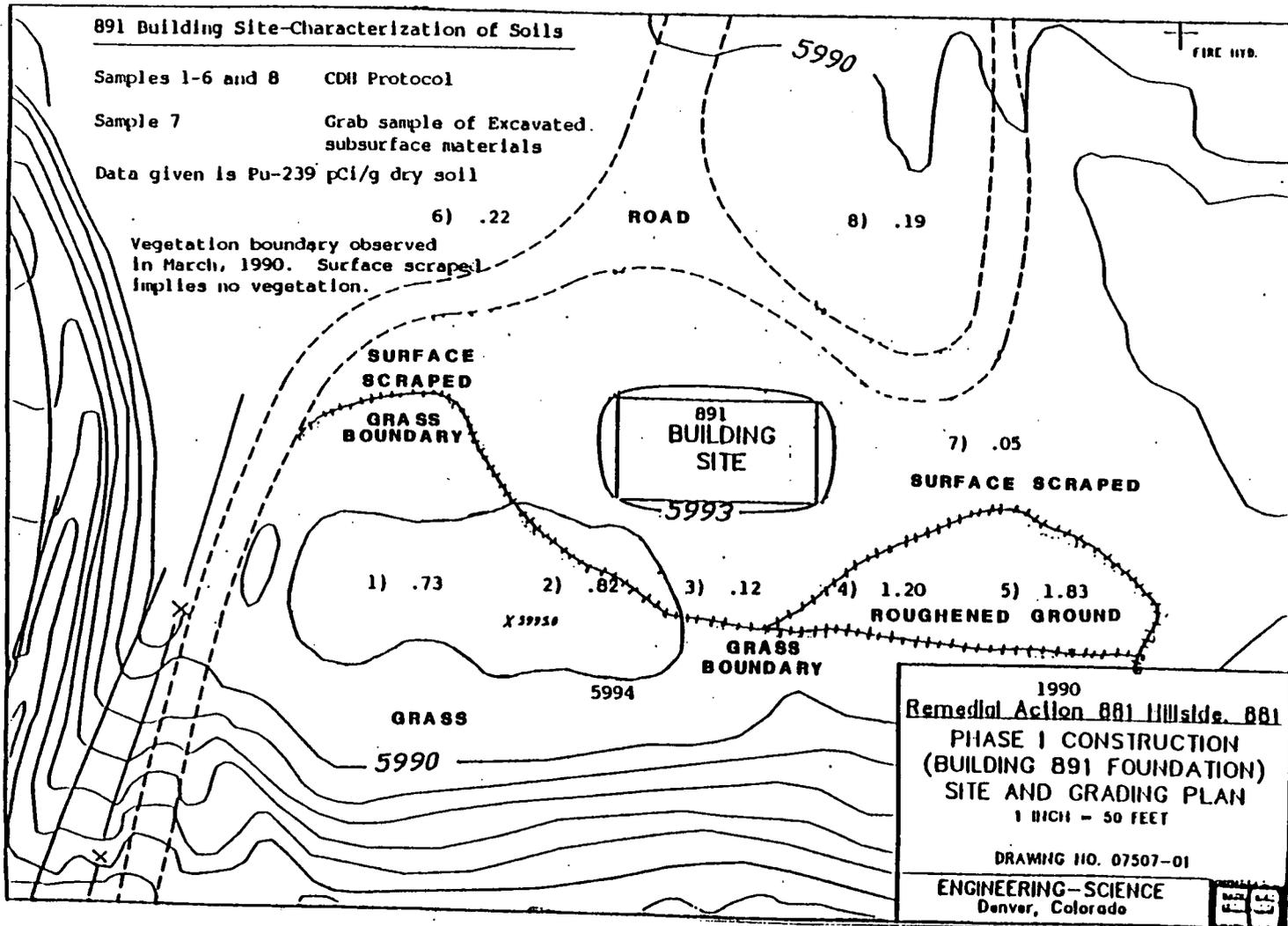
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden, Colorado

OPERABLE UNIT NO.1
PHASE III RI/FS WORK PLAN

SURFACE SCRAPE SAMPLING
LOCATIONS
September, 1988

Draft Final
October 3, 1990

3-27



Building 891 Site Soil Sampling Locations [7]

Figure 3-4

3.9 REFERENCES

- [1] Rockwell International, 1989c, Background Geochemical Characterization Report, U.S. DOE, Rocky Flats Plant, Golden, Colorado, 15 December 1989.
- [2] Department of Energy, 1990, Draft Phase III RI/FS Work Plan - 881 Hillside Area, Rocky Flats Plant, Golden, Colorado. February, 1990.
- [3] Department of Energy, 1989, Environmental Assessment for 881 Hillside (High Priority Sites), Interim Remedial Action, 30 November 1989 Draft Version, DOE/ERA 0413.
- [4] Rockwell International, 1987b, Annual Environmental Monitoring Report: June - December 1986, RFP-ENV-86, Rockwell International, Rocky Flats Plant, Golden, Colorado.
- [5] Rockwell International, 1987a, Draft Remedial Investigation Report for High Priority Sites (881 Hillside Area), U.S. DOE, Rocky Flats Plant, Golden, Colorado.
- [6] American Conference of Government Industrial Hygienists, 1989, Threshold Limit Values and Biological Exposure Indices for 1989-1990. ACGIH, Cincinnati, OH.
- [7] Internal Memo from Ron Zuck to Tom Greengard, Subject: Soil Sample Results Of 891 Building Site, dated May 23, 1990.

APPENDIX 3-1

CHEMICAL DATA SHEETS

APPENDIX 3-1
881 HILLSIDE
CHEMICAL DATA SHEET

ACETONE

SYNONYMS: DIMETHYL KETONE, PROPANONE 2-PROPANONE		NFPA: HEALTH - 1 FLAMMABILITY - 3		REACTIVITY - 0						
CHEMICAL FORMULA: CH_3COCH_3		PHYSICAL CHARACTERISTICS:								
CAS NUMBER: 67-64-1		PHYSICAL STATE: WATERY LIQUID								
RCRA WASTE NO.:		COLOR: COLORLESS								
		ODOR: SWEET ODOR								
		ODOR THRESHOLD: 100 ppm								
PHYSICAL PROPERTIES:										
MW: 58.08		VP: 226mm @ 25°C		LEL: 2.6%						
BP: 56.5°C		VD: 2.00		UEL: 12.8%						
MP: -95.3°C		SG: 0.791 @ 20°C		FP: -17.8°C						
SOL: Miscible										
IP: 9.68 ev										
EXPOSURE LIMITS:										
	TWA		STEL		CEIL		IDLH		ACTION LEVELS	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
OSHA PEL:	750	1800	1000	2400	-	-	20,000	-	-	-
NIOSH REL:	250	590	-	-	-	-	-	-	-	-
ACGIH TLV:	750	1780	1000	2380	-	-	-	-	-	-
ROUTES OF EXPOSURE:						TARGET ORGANS:				
INH, ING, CON						RESPIRATORY SYSTEM, SKIN				
SYMPTOMS OF EXPOSURE:										
Irritation of eyes, nose, throat, headache, dizziness, dermatitis										

APPENDIX 3-1
881 HILLSIDE
CHEMICAL DATA SHEET

ARSENIC

SYNONYMS:		NFPA: HEALTH -		REACTIVITY -						
		FLAMMABILITY -								
CHEMICAL FORMULA: As		PHYSICAL CHARACTERISTICS:								
CAS NUMBER: 7440-38-2		PHYSICAL STATE: Crystalline & amorphous								
RCRA WASTE NO.:		COLOR: Silver - Black								
		ODOR: Garlic								
		ODOR THRESHOLD:								
PHYSICAL PROPERTIES:										
MW: 74.92		VP: 1MM		LEL:						
BP: 612°C		VD:		UEL:						
MP: 814°C		SG:		FP:						
SOL: Insoluble										
IP:										
EXPOSURE LIMITS:										
	TWA		STEL		CEIL		IDLH		ACTION LEVELS	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
OSHA PEL:	-	0.5*-0.01**	-	-	-	-	-	-	CA	CA
NIOSH REL:	-	-	-	-	-	0.002	-	-	CA	-
ACGIH TLV:	-	0.2	-	-	-	-	-	-	-	-
ROUTES OF EXPOSURE: ING, INH, ABS, CON						TARGET ORGANS: Liver, kidneys, skin, Lungs, lymphatic system				
SYMPTOMS OF EXPOSURE: Carcinogen, peripheral neuropathy, ulceration of nasal septum, GI disturbances, respiratory irritant, hyper pigmentation of skin										

* organic compounds

** inorganic compounds

APPENDIX 3-1

881 HILLSIDE

CHEMICAL DATA SHEET

BARIUM

SYNONYMS:		NFPA: HEALTH -		REACTIVITY - 0	
		FLAMMABILITY - 0			
CHEMICAL FORMULA: Ba		PHYSICAL CHARACTERISTICS:			
CAS NUMBER: 7440-39-3		PHYSICAL STATE: Solid			
RCRA WASTE NO.:		COLOR: Silver-white lustrous metal			
		ODOR:			
		ODOR THRESHOLD:			
PHYSICAL PROPERTIES:		VP: 10 MM 1049°		LEL: N/A	
MW: 137.36		VD: 1640°C		UEL: N/A	
BP: 1640°C		SG: 3.5		FP: N/A	
MP: 725°C				SOL: INSOLUBLE	
				IP:	
EXPOSURE LIMITS:					
		TWA		STEL	
		ppm mg/m ³		ppm mg/m ³	
		-		-	
OSHA PEL:		0.5		-	
NIOSH REL:		-		-	
ACGIH TLV:		0.5		-	
				CEIL	
				ppm mg/m ³	
				-	
				IDLH	
				ppm mg/m ³	
				-	
				ACTION LEVELS	
				ppm mg/m ³	
				-	
ROUTES OF EXPOSURE:		TARGET ORGANS:			
INH, ING, CON		Eyes, heart, CNS, skin, respiratory system			
SYMPTOMS OF EXPOSURE:					
IRRITATION of eyes, throat & skin, vomiting, colic, diarrhea, slow pulse, hypertension, tremors and paralysis					

APPENDIX 3-1

881 HILLSIDE

CHEMICAL DATA SHEET

CADMIUM

SYNONYMS:		NFPA: HEALTH -		REACTIVITY - 0			
		FLAMMABILITY - 0					
CHEMICAL FORMULA: Cd		PHYSICAL CHARACTERISTICS:					
CAS NUMBER: 7440-43-9		PHYSICAL STATE: Solid					
RCRA WASTE NO.:		COLOR: Blue-White Metal or Grayish-White Powder					
		ODOR: Odorless					
		ODOR THRESHOLD: NA					
PHYSICAL PROPERTIES:		LEL: NA		SOL: Insoluble			
MW: 112.41		VP: -0		IP: NA			
BP: 767 °C		VD: NA					
MP: 320.9 °C		SG: 8.642					
EXPOSURE LIMITS:		CEIL		IDLH		ACTION LEVELS	
		ppm mg/m ³		ppm mg/m ³		ppm mg/m ³	
OSHA PEL:		0.6					
NIOSH REL:				0.05			
ACGIH TLV:							
ROUTES OF EXPOSURE:		TARGET ORGANS:					
INH, ING		Respiratory System, Lungs, Kidney, Prostate, Blood					
SYMPTOMS OF EXPOSURE: Nose and throat irritation, delayed cough, chest pain, sweating, chills, shortness of breath, weakness, death; ingestion causes nausea, vomiting, diarrhea and abdominal cramps; long-term exposure may cause loss of sense of smell, ulceration of nose, emphysema, kidney damage, mild anemia prostate cancer							

APPENDIX 3-1

881 HILLSIDE

CHEMICAL DATA SHEET

CARBON TETRACHLORIDE

SYNONYMS: Tetrachloromethane, Perchloromethane, carbon tet		NFPA: HEALTH - 3 FLAMMABILITY - 0		REACTIVITY - 0	
CHEMICAL FORMULA: CCl ₄ CAS NUMBER: 56-23-5 RCRA WASTE NO.:		PHYSICAL CHARACTERISTICS: PHYSICAL STATE: Liquid COLOR: Colorless ODOR: Sweet, Aromatic, Ether-like ODOR THRESHOLD: >10 ppm			
PHYSICAL PROPERTIES: MW: 153.8 BP: 76.8 °C MP: -23 °C		VP: 91 mmHg (20°C) VD: 5.3 SG: 1.59	LEL: NA UEL: NA FP: NA	SOL: 0.08 % IP:	
EXPOSURE LIMITS:					
	TWA		STEL		
	ppm	mg/m ³	ppm	mg/m ³	
OSHA PEL:	2	12.6	-	-	
NIOSH REL:			2*	12.6*	
ACGIH TLV:	5	31 (skin)			
ROUTES OF EXPOSURE: INH, ING, ABS, CON		TARGET ORGANS: CNS, Eyes, Lungs, Liver, Kidneys, Skin			
SYMPTOMS OF EXPOSURE: Drowsiness; dizziness; incoordination; nausea; vomiting; CNS depression; unconsciousness; skin/eye irritation/burning; heart, liver, kidney damage					

* 60 min

APPENDIX 3-1

881 HILLSIDE

CHEMICAL DATA SHEET

MANGANESE

SYNONYMS:		NFPA: HEALTH -		REACTIVITY -	
		FLAMMABILITY -			
CHEMICAL FORMULA: Mn		PHYSICAL CHARACTERISTICS:			
CAS NUMBER: 7439-96-5		PHYSICAL STATE: BRITTLE			
RCRA WASTE NO.:		COLOR: REDDISH-GRAY, silver			
		ODOR:			
		ODOR THRESHOLD:			
PHYSICAL PROPERTIES:					
MW: 55	VP: 1MM	LEL:	SOL:		
BP: 2097°C	VD:	UEL:	IP:		
MP: 1245°C	SG: 7.2	FP:			
EXPOSURE LIMITS:					
TWA		STEL		ACTION LEVELS	
ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
OSHA PEL:				5	
NIOSH REL:					
ACGIH TLV:		5			
ROUTES OF EXPOSURE:			TARGET ORGANS:		
Inh, Ing			Resp. sys, CNS, blood, kidneys		
SYMPTOMS OF EXPOSURE: Parkinsons, asthenia, insomnia, neurological symptoms, fever, dry throat, cough, tight chest, dyspnea; low back pain; vomiting					

APPENDIX 3-1

881 HILLSIDE

CHEMICAL DATA SHEET

MERCURY

SYNONYMS: QUICK SILVER		NFPA: HEALTH - FLAMMABILITY -		REACTIVITY - NON COMUSTABLE	
CHEMICAL FORMULA: Hg		PHYSICAL CHARACTERISTICS:			
CAS NUMBER: 7439-97-6		PHYSICAL STATE: Liquid			
RCRA WASTE NO.:		COLOR: Silver			
		ODOR: Odorless			
		ODOR THRESHOLD:			
PHYSICAL PROPERTIES:					
MW:	VP: 2Y10, MM	LEL:	SOL: 0.002%		
BP: 357°C	VD:	UEL:	IP:		
MP: -39°C	SG: 13.5	FP:			
EXPOSURE LIMITS:					
	TWA	STEL	CEIL	IDLH	ACTION LEVELS
	ppm mg/m ³	ppm mg/m ³	ppm mg/m ³	ppm mg/m ³	ppm mg/m ³
OSHA PEL:	0.05(skin)			28	
NIOSH REL:	0.05		0.3		
ACGIH TLV:	0.05(skin)				
ROUTES OF EXPOSURE: INH, ABS, COM		TARGET ORGANS: systemic: respiratory system, CNS, skin, GI tract			
SYMPTOMS OF EXPOSURE: Acute: headaches, cough, dyspnea, soreness of mouth, loss of teeth, nausea, diarrhea; Chronic: tremors in hands, eyelids, lips, tongue or jaw; skin rash, headaches, neurological symptoms.					

APPENDIX 3-1

881 HILLSIDE

CHEMICAL DATA SHEET

METHYLENE CHLORIDE

SYNONYMS: Methylene Dichloride Dichloromethane		NFPA: HEALTH - 2 FLAMMABILITY - 0		REACTIVITY - 1		
CHEMICAL FORMULA: CH ₂ Cl ₂		PHYSICAL CHARACTERISTICS:				
CAS NUMBER: 75-09-2		PHYSICAL STATE: Liquid				
RCRA WASTE NO.:		COLOR: Colorless				
		ODOR: Pleasant, Aromatic				
		ODOR THRESHOLD: 205-307 ppm				
PHYSICAL PROPERTIES:						
MW: 85		VP: 350 mm Hg		LEL: 12%		
BP: 104°F		VD: 2.93		UEL: 19%		
MP: -142°F		SG: 1.33		FP: NA		
SOL: 1.3%						
IP: 11.35 ev						
EXPOSURE LIMITS:						
	TWA		STEL		CEIL	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
OSHA PEL:	500(T)	-	2000(T)	-	1000(T)	-
NIOSH REL:						
ACGIH TLV:	50	174	-	-	-	-
IDLH						
ACTION LEVELS						
ppm mg/m ³						
ROUTES OF EXPOSURE:			TARGET ORGANS:			
INH, ING, CON			Skin, CVS, Eyes, CNS			
SYMPTOMS OF EXPOSURE:						
Light headedness; Mental Confusion; Weakness; Fatigue; Nausea; Vomiting;						
Headache; Loss of Consciousness; Skin, Eye Irritation.						

APPENDIX 3-1

881 HILLSIDE

CHEMICAL DATA SHEET

SILICA (CRYSTALLINE QUARTZ)

SYNONYMS: Quartz, cristobalite, tridymite		NFPA: HEALTH -		REACTIVITY -	
		FLAMMABILITY -			
CHEMICAL FORMULA: SiO ₂		PHYSICAL CHARACTERISTICS:			
CAS NUMBER: 14808-60-7		PHYSICAL STATE:			
RCRA WASTE NO.:		COLOR: colorless			
		ODOR: odorless			
		ODOR THRESHOLD:			
PHYSICAL PROPERTIES:					
MW: 60	VP: - 0mm	LEL:	SOL: insoluble		
BP: 4046°	VD:	UEL:	IP:		
MP: 2912°	SG:	FP:			
EXPOSURE LIMITS:					
	TWA	STEL	CEIL	IDLH	ACTION LEVELS
	ppm mg/m ³	ppm mg/m ³	ppm mg/m ³	ppm mg/m ³	ppm mg/m ³
OSHA PEL:	0.1*				
NIOSH REL:	0.05*				
ACGIH TLV:	0.1*				
ROUTES OF EXPOSURE: INH		TARGET ORGANS: Respiratory system			
SYMPTOMS OF EXPOSURE: Coughing, dyspnea, wheezing, impaired pulmonary function, progressive symptoms.					

*Respirable dust

APPENDIX 3-1

881 HILLSIDE

CHEMICAL DATA SHEET

1,1,2,2-TETRACHLOROETHANE

SYNONYMS: acetylene tetrachloride, Tetrachloroethane, ethane tetrachloride		NFPA: HEALTH - FLAMMABILITY -		REACTIVITY -						
CHEMICAL FORMULA: CHCl_2 , CHCl_2		PHYSICAL CHARACTERISTICS:								
CAS NUMBER: 79-34-5		PHYSICAL STATE: Liquid or Solid								
RCRA WASTE NO.:		COLOR: Colorless, Yellowish Green								
		ODOR: Slight Ether Like Odor								
		ODOR THRESHOLD:								
PHYSICAL PROPERTIES:										
MW: 168		VP: 8mm Hg		LEL: NA						
BP: 146°C		VD: 5.8		VEL: NA						
MP: -42.5°C		SG: 1.6		FP: NA						
SOL: .29%										
IP: 11.1										
EXPOSURE LIMITS:										
	TWA		STEL		CEIL		IDLH		ACTION LEVELS	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
OSHA PEL:	1	7(skin)	-	-	-	-	-	-	-	-
NIOSH REL:							CA			
ACGIH TLV:	1	6.9(skin)	-	-	-	-				
ROUTES OF EXPOSURE:						TARGET ORGANS:				
INH, ABS, ING, CON						Liver, Kidneys, CNS				
SYMPTOMS OF EXPOSURE: Acute - Eye, Nose Irritation; Nausea, Vomiting, Drowsiness; Kidney, Liver Damage, Severe Exposures - Skin may turn deep dusky color within a few hours, Unconsciousness, Death; Chronic Fatigue, Loss of appetite, Tremors, Weight loss.										

APPENDIX 3-1

881 HILLSIDE

CHEMICAL DATA SHEET

TOLUENE

SYNONYMS: Toluol, methylbenzene, methylbenzol, phenylmethane		NFPA: HEALTH - 2 REACTIVITY - 0 FLAMMABILITY - 3						
CHEMICAL FORMULA: C ₆ H ₅ CH ₃ CAS NUMBER: 108-88-3 RCRA WASTE NO.:		PHYSICAL CHARACTERISTICS: PHYSICAL STATE: liquid COLOR: colorless ODOR: ODOR THRESHOLD:						
PHYSICAL PROPERTIES: MW: 92 BP: 111°C MP: -95°C		VP: 22mm VD: 3.14 SG: 0.86	LEL: 1.27 UEL: 7.1 FP: 4°					
SOL: 0.05 IP: 8.82								
EXPOSURE LIMITS:								
	TWA		STEL		CEIL	IDLH	ACTION LEVELS	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
OSHA PEL:	100	375	150	560				
NIOSH REL:	100	375	200	750				
ACGIH TLV:	100	377	150	565		2000		
ROUTES OF EXPOSURE: INH, ABS, ING, CON					TARGET ORGANS: Eyes, respiratory track, skin			
SYMPTOMS OF EXPOSURE: Acute: eye, respiratory and skin irritation; fatigue, weakness, confusion, headache, dizziness and drowsiness; numbness, unconsciousness or death; inhalation may cause difficulty seeing in bright light. Chronic: drying or cracking of skin.								

APPENDIX 3-1

881 HILLSIDE

CHEMICAL DATA SHEET

1,1,1 - TRICHLOROETHANE

SYNONYMS: methyl chloroform, 1,1,1-TCE		NFPA: HEALTH -		REACTIVITY -				
		FLAMMABILITY -						
CHEMICAL FORMULA: C ₂ H ₃ Cl ₃			PHYSICAL CHARACTERISTICS:					
CAS NUMBER: 71-55-6			PHYSICAL STATE: Liquid					
RCRA WASTE NO.: U226			COLOR: Colorless					
			ODOR: Pleasant Odor					
			ODOR THRESHOLD:					
PHYSICAL PROPERTIES:								
ML:	VP: 40mm	LEL:	SOL:					
BP: 114°	VD:	UEL:	IP:					
MP:	SG:	FP: -35°						
EXPOSURE LIMITS:								
	TWA		STEL		CEIL	IDLH	ACTION LEVELS	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
OSHA PEL:	350	1900	450	2450				
NIOSH REL:	-	-	-	-	350	1910		
ACGIH TLV:	350	1910	450	2460				
ROUTES OF EXPOSURE: INH, ING, CON			TARGET ORGANS: Eyes, nose, lungs, liver, kidneys					
Intravenous & Subcutaneous								
SYMPTOMS OF EXPOSURE: Irritation of eyes, mucous membranes, skin irritation								

APPENDIX 3-1

881 HILLSIDE

CHEMICAL DATA SHEET

1,1,2-TRICHLOROETHANE

SYNONYMS: Vinyl trichloride, B-trichloroethane		NFPA: HEALTH - 3 FLAMMABILITY - 1		REACTIVITY - 0						
CHEMICAL FORMULA: CHCl ₂ CH ₂ Cl		PHYSICAL CHARACTERISTICS:								
CAS NUMBER: 79-00-5		PHYSICAL STATE: Liquid								
RCRA WASTE NO.:		COLOR: Clear								
		ODOR: Sweet/like chloroform								
		ODOR THRESHOLD:								
PHYSICAL PROPERTIES:										
MW: 133		VP: 19mm		LEL: 6%						
BP: 236 F		VD:		UEL: 15.5%						
MP: -34 F		SG:		SOL: 0.5%						
				IP:						
				FP: none						
EXPOSURE LIMITS:										
	TWA		STEL		CEIL		IDLH		ACTION LEVELS	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
OSHA PEL:	10	45								
NIOSH REL:	10	45								
ACGIH TLV:	10	55								
ROUTES OF EXPOSURE: Inhalation, Absorption, Ingestion, Contact						TARGET ORGANS: CNS, eyes, nose, liver, kidneys				
SYMPTOMS OF EXPOSURE: irritated nose, eyes; CNS depression, liver and kidney damage										

APPENDIX 3-1

881 HILLSIDE

CHEMICAL DATA SHEET

1, 2-DICHLOROETHANE

SYNONYMS: Ethylene dichloride ethylene chloride, dutch oil		NFPA: HEALTH - 2 FLAMMABILITY - 3		REACTIVITY - 0						
CHEMICAL FORMULA: $C_2H_2Cl_2$		PHYSICAL CHARACTERISTICS:								
CAS NUMBER: 107-06-2		PHYSICAL STATE: Oily liquid								
RCRA WASTE NO.:		COLOR: Clear								
		ODOR: Like Chloroform								
		ODOR THRESHOLD: 87ppm								
PHYSICAL PROPERTIES:										
MW: 99		VP: 62mm		LEL: 6.2%						
BP: 183 F		VD:		UEL: 16%						
MP: -32 F		SG:		SOL: 0.8%						
				IP: 9.64						
EXPOSURE LIMITS:										
	TWA		STEL		CEIL		IDLH		ACTION LEVELS	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
OSHA PEL:	1	4	2	8						
NIOSH REL:	50				100					
ACGIH TLV:	10	40								
ROUTES OF EXPOSURE: Inhalation, ingestion, contact, absorption						TARGET ORGANS: Skin, Liver, Kindeys, Eyes, CNS				
SYMPTOMS OF EXPOSURE: Central nervous system depression, nausea, vomitting, dermatitis, irritated eyes corneal opacity, carcinogen										

APPENDIX 3-1

881 HILLSIDE

CHEMICAL DATA SHEET

1, 1-DICHLOROETHANE

SYNONYMS: Ethylidene chloride 1,1-ethylidene dichloride		NFPA: HEALTH - 2 FLAMMABILITY - 3		REACTIVITY - 0						
CHEMICAL FORMULA: CH_3CHCl_2		PHYSICAL CHARACTERISTICS:								
CAS NUMBER: 75-34-3		PHYSICAL STATE: Liquid								
RCRA WASTE NO.:		COLOR: Clear								
		ODOR: Like Chloroform								
		ODOR THRESHOLD: none								
PHYSICAL PROPERTIES:										
MW: 99		VP: 182mm		LEL: 6.0%						
BP: 135 F		VD:		UEL: 16%						
MP: -142 F		SG: 1.2		FP: 17 F						
EXPOSURE LIMITS:										
	TWA		STEL		CEIL		IDLH		ACTION LEVELS	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
OSHA PEL:	100	400								
NIOSH REL:	100	400					4000			
ACGIH TLV:	200	810	250	1010						
ROUTES OF EXPOSURE: Inhalation, ingestion, contact						TARGET ORGANS: Skin, Liver, Kindeys				
SYMPTOMS OF EXPOSURE: Central nervous system depression, skin irritation, drowsiness, unconsciousness liver and kidney damage										

4.0 HAZARD COMMUNICATION

4.1 Introduction

As required by the Rocky Flats Plant Hazard Communication Program (Health and Safety Practices Manual, Section 9.07), all EG&G personnel must follow established work practices to safely handle hazardous chemicals. In the H&SP Manual, a Hazardous Chemical is broadly defined as "a chemical that is either a health hazard, a physical hazard or both". The implementation of hazard communication is also required by 29 CFR 1910.120 for RCRA Treatment, Storage and Disposal Facilities such as Building 885, the Drum Storage site (SWMU 177) which is located within the 881 Hillside. The EG&G Hazard Communication Program has been developed to limit the risks of personnel exposures, damage to buildings and equipment, and the unplanned release of hazardous chemicals to the environment due to normal operations. The Program includes protocols for assessment of the hazards associated with chemicals on site; inventory and labeling of chemicals; communication of hazards to the employee through Material Safety Data Sheets (MSDSs); hazard communication training; acquisition, transportation and handling of chemicals; and emergency response to releases of chemicals.

The requirements of this program apply to EG&G personnel working at 881 Hillside in the event that they need to store hazardous chemicals such as: calibration gases or radiological calibration sources for field monitoring equipment, fuel, caustic compounds for sample preservation, or solvents for equipment decontamination on the site.

Subcontractors must also implement a hazard communication program for their employees working at the Rocky Flats Plant. As part of the program, they must maintain an inventory of hazardous chemicals stored on site, and MSDSs for these chemicals must be available to all employees at the site.

4.2 Hazardous Materials Inventory

The EG&G Industrial Hygiene Department coordinates the inventory of hazardous chemicals used or stored at the plant. The inventory is utilized for reporting and emergency response purposes. If hazardous chemicals need to be stored by EG&G personnel at the 881 Hillside or in the subcontractor trailer area, an inventory of these chemicals must be forwarded to the Industrial Hygiene Department. Data contained in the inventory is to include the name, quantity, and location of the chemical and the name and department of the chemical's owner.

Subcontractors must compile an inventory of all hazardous chemicals present at their worksites or trailer areas and provide this information on their work permit. The inventory may be requested by emergency response personnel to aid in identifying hazards associated with a spill or accident at the site.

4.3 Material Safety Data Sheets

Material Safety Data Sheets (MSDSs) must be readily available to employees for all hazardous chemicals stored at the site. Information found on a MSDS includes: identification of the product's hazardous chemical constituents, its physical characteristics, applicable exposure limits, symptoms of overexposure, recommended personal protective equipment, fire and explosion hazards, and spill response actions. This information is provided by the manufacturer and is typically included with the shipment of the chemical. The IH Department maintains a master file containing MSDSs for materials stored or used at the Plant. A complete file of MSDSs on all hazardous chemicals used at the 881 Hillside needs to be kept at the site field office and readily available to all site employees.

4.4 Training

All EG&G personnel are required to complete Hazard Communication training. The course is a computer based training (CBT) program developed to familiarize employees with the Hazard Communication Program. The course includes a summary of applicable Federal regulations and EG&G policies related to hazard communication, hazardous materials evaluation responsibilities within the plant, chemical labeling, MSDS and sources of hazard information. The course is approximately one hour in length and is required every two years. A description of the Hazard Communication Training and course outline are provided in Chapter 10 of this HSP, Section 10.1.4 and Table 10-3. Specific chemical training on the information provided on the MSDSs is to be conducted at the site by the Site Health & Safety Officer.

5.0 SITE CONTROL

5.1 Objectives

The purpose of this site control plan is to protect workers, the public and the environment from the potential hazards associated with the 881 Hillside environmental restoration work. The OSHA hazardous waste operations standard, 29 CFR 1910.120, stipulates that a site control plan will include a site map, identification of site work zones, a description of site communications, the requirements for the use of a buddy system, safe work practices and identification of the nearest medical facility.

The 881 Hillside, located in the southeast portion of the plant (see Figure 1-2), is an access controlled area because of clean up operations and sampling of potentially contaminated soil, ground water and surface water. Background data collected during the Remedial Investigation/Feasibility Study (RI/FS) process (See Section 3) indicate the presence of elevated levels of organic and inorganic chemicals and radionuclides in the soil and ground water at the site.

The terms "site control" and "controlled" versus "uncontrolled" are used in this section in the context of hazardous waste sites. This OSHA terminology does not necessarily apply to formal radiological definitions used in the Rocky Flats Plant (RFP) production facilities.

In addition to site control measures required under the OSHA 1910.120 Standard, activities conducted on the 881 Hillside are also restricted by the RFP Work Permit System. Information required in the work permit include job information, description of hazards, radiological and nonradiological safety requirements, preparation for the job, approval signatures, and permit duration. A copy of the work permit is included as Figure 5-1.

5.2 Site Control Designations

Two site control designations are used at the site, as shown in Figure 5-2. The entire Operable Unit is designated as a "Restricted Area" and the Solid Waste Management Units (SWMUs) are

designated as "Controlled Areas". Access into these areas will be controlled, appropriate PPE will be required, and personnel working in the areas must meet specific training requirements and be participants in a medical surveillance program. Minimum requirements for access into these designated areas are summarized below. Detailed PPE, training, and decontamination requirements are presented in the respective sections of this HSP.

5.2.1 Restricted Area

The entire area identified as Operable Unit 1 (881 Hillside) will be designated and posted as a "Restricted Area". All personnel conducting activities or supervising activities in this area are required to provide documentation of OSHA and Radiation Worker training (as described in Section 10) and medical clearance. The OSHA training requirement (29 CFR 1910.120 (e)) is applicable to EG&G and subcontractor personnel at the site because the data compiled in the RI/FS indicate potential contamination in ground water and surface soils beyond the SWMU boundaries. Signs designating the "Restricted Area" (Figure 5-3) will be posted along the road which passes through the site and along the area boundaries.

5.2.2 Controlled Areas

All the SWMUs within the 881 Hillside area will be designated as "Controlled Areas". Environmental samples collected in these sites contained elevated levels of radiological and/or chemical contaminants. Personnel entering these areas will be required to utilize a sign-in/sign-out sheet and wear PPE. When leaving these areas, decontamination procedures (described in Section 7) including clearance by Radiation Protection Technicians (RPTs), will be followed.

Uranium-238 was detected in surface soil samples collected in SWMU 119.1 at concentrations which range from 0.88 ± 0.15 pCi/g to 3000 ± 300 pCi/g (see Table 3-4). In addition to the PPE required within the SWMUs, Radiological Engineering may determine that respiratory protection is required in SWMU 119.1.

The SWMUs will be identified by appropriate markings. Signs will be posted stating the area is "Controlled" and will identify the SWMU number (Figure 5-4).

5.2.3 Task Specific Exclusion Zones

During sampling and restoration activities at the 881 Hillside, exclusion zones will be established by EG&G or subcontractor personnel conducting work at the site. The limits of these zones and the PPE requirements within the zones, will be based on the hazards of the work being conducted as determined by the appropriate H&S representative. Visitors and observers will comply with the site control designations and the zone requirements established at the worksite. Visitors will not be allowed to enter the exclusion zone without verification of training and medical clearance.

5.3 General Operating Procedures

Standard safety guidelines for site personnel are outlined in the Rocky Flats Plant Health and Safety Practices Manual. Specific requirements, applicable to personnel at the 881 Hillside, including a description of the site communication system and the requirements of the buddy system, are described in this section.

EG&G personnel will not conduct work activities alone on the 881 Hillside. They will be accompanied by either another EG&G or subcontractor employee. The "Buddy System", as specified in 29 CFR 1910.120 (d)(3), will be implemented at the site. The buddy teams working at the site will maintain visual and audible contact so that they may provide emergency assistance to each other, if needed. Both members of the buddy team need not be in the same site zone, but each member must be wearing adequate PPE to assist the other member, if necessary.

Telephones and hand-held radios comprise the communication system at the site. EG&G personnel will have access to telephones in the subcontractor trailer area, and when on the 881 Hillside they will rely on the hand-held radio system utilized by subcontractors performing the restoration work.

5.4 Medical Assistance

As described in Section 8, onsite emergency medical assistance is provided onsite by EG&G Emergency Medical Technicians (EMTs) who can be reached by phone or radio. Additional assistance is available through the Occupational Health Department located in Building 122.

FIGURE 5-1

RADIOLOGICAL/HEALTH & SAFETY WORK PERMIT

Instructions and requirements for the use of this form are contained in H&S 6.05 Radiological/H&S Work Permit

SECTION I - JOB INFORMATION (To be completed by job supervisor or permit initiator)

Job Name _____ Auth or WO # _____

Bldg. _____ Room # _____ Date _____ From _____ (AM/PM) To _____ (AM/PM)

Scope of Work _____

SECTION II - DESCRIPTION OF HAZARDS (To be completed by responsible user)

MATERIAL HAZARDS

- ___ HNO₃ (Nitric Acid)
- ___ HCl (Hydrochloric Acid)
- ___ H₂SO₄ (Sulfuric Acid)
- ___ HF (Hydrofluoric Acid)
- ___ Causic
- ___ Flammables
- ___ Trichloroethylene
- ___ Beryllium
- ___ Plutonium
- ___ Uranium
- ___ Asbestos

ELECTRICAL HAZARDS

- Energized System?
 - ___ Yes ___ No
- ___ 120V
- ___ 220V
- ___ 480V
- ___ 600V
- ___ Above 600V _____ V
- ___ Laser involved?
- ___ Microwave involved?

HIGH TEMP/HIGH PRESSURE

- ___ Vacuum
- ___ Ambient Pressure
- ___ <15 psig
- ___ >15 psig
- ___ _____ psig
- ___ Below Ambient Temp _____ °F
- ___ Ambient Temp _____ °F
- ___ Above Ambient Temp _____ °F
- ___ Steam System
- ___ Hydraulic System

Fire Suppression Interruption? ___ Yes ___ No

Other hazards and precautions _____

SECTION III - RADIOLOGICAL AND NONRADIOLOGICAL SAFETY REQUIREMENTS (To be completed by Radiological Protection, and/or H&S Area Engineer).

ISA REQUIRED ___ Yes ___ No

JOB SITE REVIEW REQUIRED ___ Yes ___ No

1/4" PACKAGE REQUIRED ___ Yes ___ No

RADIOLOGICAL PROTECTION TECHNOLOGIST (RPT) REQUIRED ___ YES ___ NO

PROTECTIVE APPAREL

- ___ Coveralls
- ___ Tyvek Suit
- ___ Plastic Suit
- ___ Acid Suit
- ___ Surgeon's Gloves
- ___ Rubber Gloves
- ___ Leather Gloves
- ___ Cloth Cap
- ___ Cloth Hood
- ___ Plastic Hood
- ___ Boots
- ___ Plastic Boots
- ___ Rubber Boots
- ___ Safety Glasses
- ___ Goggles
- ___ Face Shield
- ___ Hard Hat
- ___ Hearing Protection
- ___ Taped Openings
- ___ Other _____

RESPIRATORY REQUIREMENTS

- ___ Half Mask
- ___ Full Face
- ___ Supplied Breathing Air
- ___ SCBA
- ___ Chemical Canister

RADIOLOGICAL PROTECTION REQUIREMENTS

- ___ Start of job
- ___ On call
- ___ Full time

DOSIMETRY REQUIREMENTS

- ___ TLD Dosimeter
- ___ Extremity Dosimeter
- ___ Special Dosimeter

ELECTRICAL PROTECTION REQUIREMENTS

- (Consult Job Supervisor)
- ___ Insulating Mat
- ___ Insulating Blanket
- ___ Cover up
- ___ High Voltage Sleeves
- ___ High Voltage Gloves
 - ___ Class I
 - ___ Class II
- ___ Hot Sticks
- ___ TIC Tracer
- ___ Insulated Bucket Truck
- ___ Grounding Cable
- ___ Grounding Stick

CONTAMINATION CONTROL VENTILATION REQUIREMENTS

- ___ Containment Pen
- ___ Plastic House
- ___ SBA House
- ___ Plastic Sleeve
- ___ Glove Bag
- ___ Air Mover
- ___ Down Draft
- ___ GB Exhaust
- ___ Other _____

RADIOLOGICAL PROTECTION PRE-JOB SURVEY

Contamination levels and extent _____

Gamma _____
Neutron _____
Limitations _____

RPT Signature _____

RADIOLOGICAL PROTECTION POST-JOB SURVEY

Contamination levels and extent _____

Gamma _____
Neutron _____

RPT Signature _____

Other Special Requirements _____

FIGURE 5-1 (CONT)

RADIOLOGICAL/HS&E WORK PERMIT - CONTINUED

Auth or WO # _____ Date _____

SECTION IV - PREPARATION FOR THE JOB (To be completed by the responsible user and job supervisor)

The area or equipment is ready to be worked on and is in safe condition Yes
 The necessary systems have been shutdown, drained, blanked, etc. Yes N/A
 The necessary systems have been locked out/tagged out. # _____ Yes N/A
 Voltage checked after lock out. Yes N/A
 Utilities has been notified of upcoming work and is prepared. Yes N/A
 The Fire Department has been notified of upcoming work and is prepared. Yes N/A

SECTION V - APPROVAL SIGNATURES

THE ABOVE REQUIREMENTS HAVE BEEN REVIEWED WITH AND ARE UNDERSTOOD BY ALL JOB PERSONNEL

(Job personnel signatures)

The Building Manager (or designee) has been notified of upcoming work _____
 (notifier's initials)

THE SIGNATURES BELOW INDICATE REVIEW AND CONCURRENCE WITH THE WORK PERMIT.

Responsible User _____

Job Supervisor _____

Radiological Monitoring Foreman (if applicable) _____

Contractor Supervisor (if applicable) _____

HS&E Safety Engineer _____

Other _____

SECTION VI - PERMIT EXTENSION

WORK PERMIT EXTENDED TO: _____

HS&E Safety Engineer _____

Job Supervisor agrees to tour area daily to ensure compliance with HS&E requirements. (Initials required for each day of extension)

Dates: _____

Initials: _____

DISTRIBUTION

Job Supervisor - White (retain permanently with job file)
 Responsible User - Blue (retain for 30 days)
 Radiological Monitoring - Yellow (retain for 30 days)

POST CARD AT JOB SITE

FIRE AND EMERGENCY - DIAL 2911

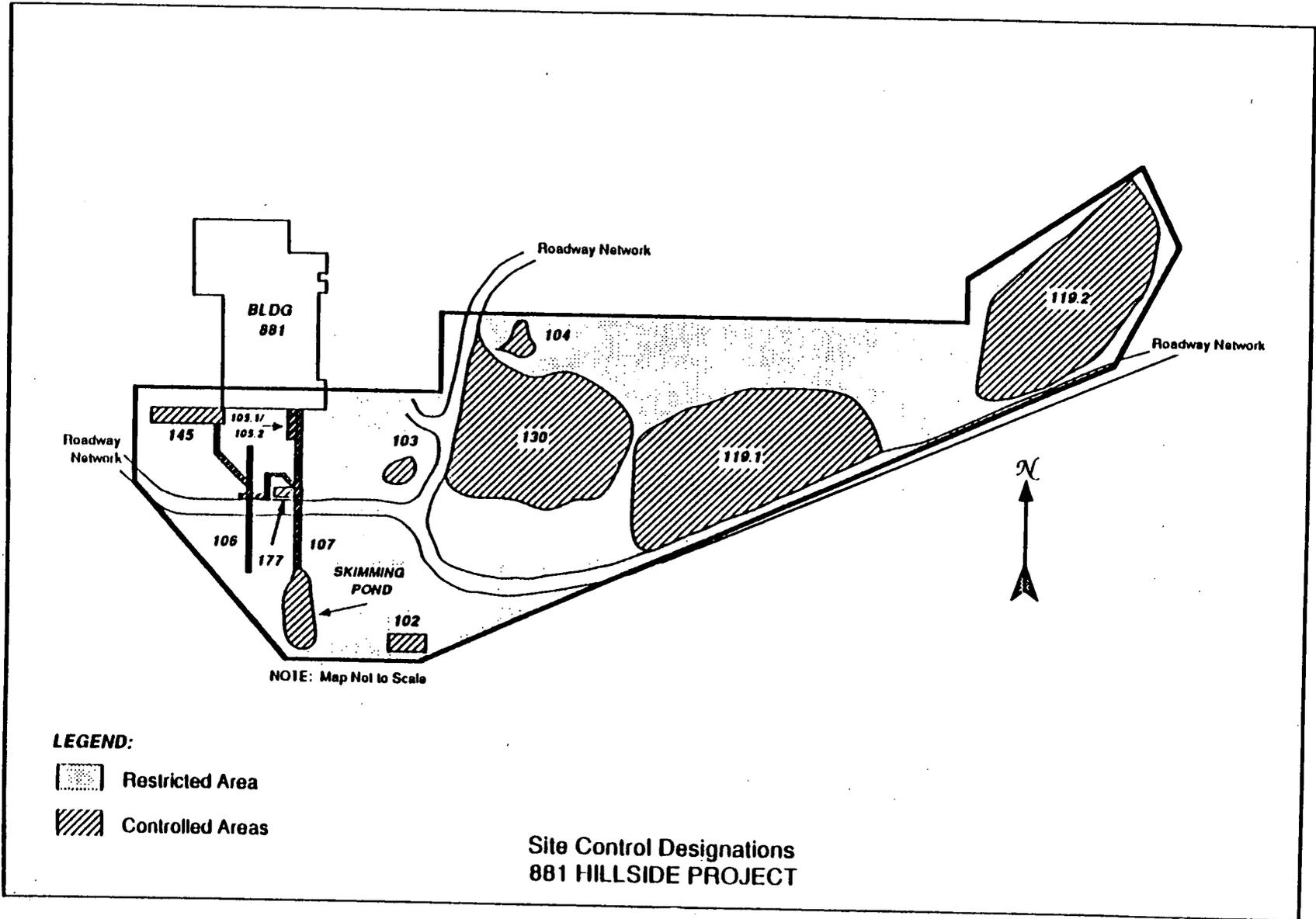


FIGURE 5-2

FIGURE 5-3

Site Control Signage for 881 Hillside

RESTRICTED
AREA

Environmental Restoration in Progress
For Access Call Environmental Restoration
at Ext. 5965

FIGURE 5-4

Radiation Signage for SWMUs

CAUTION



CONTROLLED AREA

Solid Waste Management Unit # _____

6.0 PERSONAL PROTECTIVE EQUIPMENT

6.1 Introduction

Standard procedures for the selection, inspection and use of personal protective equipment (PPE) at the 881 Hillside site are addressed in this section. The criteria used to determine appropriate levels of protective equipment include evaluation of the task being performed; potential chemical, radiological and mechanical hazards at the site; monitoring data; effectiveness of engineering controls; and applicable regulations.

A number of federal agencies dictate the need for PPE at hazardous waste sites. Among these agencies are OSHA, EPA, and DOE. Table 6-1 lists the specific OSHA standards which impact the manufacturing, selection, and use of PPE.

All subcontractors are required to evaluate the hazards of the tasks they are to perform and establish adequate personal protective equipment (PPE) levels to protect their employees. At a minimum, EG&G personnel requiring access into areas zoned by subcontractors as restricted or exclusionary will follow subcontractor PPE requirements.

A site control plan has been developed to limit access of personnel to the 881 Hillside (Section 5). In addition, specific historical disposal sites designated in the Interagency Agreement (IAG) as Solid Waste Management Units (SWMU) have been identified on the 881 Hillside Operable Unit (OU). Because of unique hazards associated with defined tasks, several subcontractors may perform tasks concurrently within a SWMU and require different zoning and PPE.

The actual selection of PPE is a complex matter which must be evaluated by the Occupational Safety, Radiological Engineering and Industrial Hygiene Departments. Minimum requirements established by EG&G are defined in this document.

6.2 General Application Of PPE

The use of PPE is required when engineering and administrative controls are insufficient to prevent worker exposures to hazardous chemical and radioactive materials. Due to the nature of work performed on the 881 Operable Unit, there is a potential for the release of vapors and particulates which can not be completely controlled at the source. Engineering and administrative controls will be used, when appropriate, to minimize potential exposures; however, the use of PPE is necessary in maintaining exposure as low as reasonably achievable (ALARA).

6.3 PPE Issues Applicable To All Site Personnel

All personnel assigned to the 881 Hillside must be trained in the proper inspection and use of PPE before beginning work on the site. For workers required to wear respiratory protection, this training requirement is fulfilled through the completion of the 40 hour OSHA course discussed in Section 10 "Training". All 881 Hillside personnel (EG&G and subcontractors) required to wear a respirator must be quantitatively fit tested at least annually per EG&G protocols. This includes both a Fit Test by Industrial Hygiene and completion of the Computer Based Training (CBT) module on Respiratory Protection.

All EG&G personnel assigned to the 881 Hillside must have a current medical "fit-for-duty" clearance issued by the EG&G Occupational Health Department. This clearance will be updated annually with the employee's physical exam as described in Section 8 "Medical Surveillance". Subcontractors must also have current medical "fit-for-duty" clearances for all site personnel on file at the site. PPE may not be used if the medical clearance has expired.

Workers required to use PPE must do so in buddy teams. The team members are responsible for the inspection of each others' equipment during donning and during field use. An inspection checklist is presented in Table 6-2.

Workers experiencing any unusual symptoms of fatigue, dizziness, high body temperature, skin or respiratory irritation or suspected overexposure should immediately withdraw from the work area and go through decontamination. The employee should then notify his/her supervisor, and the incident should be reported immediately by the supervisor to the Occupational Health Department and Industrial Hygiene.

Table 6-3 lists the protective clothing ensembles for A through D levels of protection as defined in the NIOSH document titled Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. The Table also lists the level of protection provided by each level, criteria for when the protective equipment should be used, and the limiting factors of the respective protective equipment.

6.4 Restricted Areas

The entire 881 Hillside (Operable Unit 1) is designated and posted as a "Restricted Area". Minimum "Level D" PPE is required for anyone entering this area including safety shoes, Class I eye protection with side shields, and a hard hat. Each designated work zone within the "Restricted Area" may have additional PPE requirements which must be met by anyone requiring access to the area.

6.5 Solid Waste Management Units

All SWMUs within the 881 Hillside Operable Unit are designated and posted as "Controlled Areas". Minimum PPE requirements for anyone entering these areas include "Level D" clothing as defined above, plus Tyvek coveralls and disposable booties.

6.6 SWMU 119.1

Surface soil samples collected in SWMU 119.1 showed elevated concentrations of Uranium-238 (see Table 3-4), therefore respiratory protection may be required for anyone entering this area. Respiratory protection requirements will be determined by the Radiological Engineering and Industrial Hygiene Departments. Minimum PPE requirements in this SWMU include "Level

D" protective clothing plus Tyvek coveralls, disposable booties, safety shoes, Class I eye protection and hard hats.

6.7 PPE Requirements For On-Site Spill Clean Up

The PPE requirements for spill clean-up crews is designated as "Level C" protective clothing and will include:

- o company furnished coveralls,
- o impervious Tyvek coveralls with hoods and boots,
- o safety shoes,
- o plastic boot covers (taped to Tyvek coveralls),
- o booties (over plastic covers),
- o respiratory protection,
- o hood (taped in place), and
- o Viton gloves (or gloves with equivalent permeation resistance) over surgical gloves for wet product handling and a minimum of double surgical gloves for dry product handling.

6.8 Re-Use Of PPE

Tyvek coveralls may be used for the duration of a work period. However, Tyveks should be removed and disposed of during decontamination whenever a worker leaves the exclusion or contamination reduction zone (CRZ). The length of the service life of a respirator cartridge will be determined by Industrial Hygiene. This time period may be shortened if the cartridge

becomes saturated with moisture, breathing resistance is excessive, or chemical odors are detected by the worker. Respirators must be sent back to the Plant Laundry when the cartridges need to be changed.

Respirators should be wiped clean by site personnel as they are removed. They must be stored in a plastic bag, with the cartridge side down so that distortion of the facepiece does not occur.

TABLE 6-1
OSHA STANDARDS FOR USE OF PPE

TYPE OF PROTECTION	REGULATION	SOURCE
General	29 CFR Part 1910.132 General Requirements for Personal Protective Equipment	41 CFR Part 50-204.7
	29 CFR Part 1910.1000 29 CFR Part 1910.1001-1045	OSHA Rulemaking OSHA Rulemaking.
Eye & Face	29 CFR Part 1910.133(a)	ANSI Z87.1-1968 ^a Eye & Face Protection
Noise Exposure	29 CFR Part 1910.95	41 CFR Part 50-204.10 & OSHA Rulemaking.
Respiratory	29 CFR Part 1910.134	ANSI Z88.2-1969 ^a Standard Practice for Respiratory Protection.
Head	29 CFR Part 1910.135	ANSI Z89.1-1969 ^a Safety Requirements for Industrial Head Protection.
Foot	29 CFR Part 1910.136	ANSI Z41.1-1967 ^a Men's Safety Toe Footwear.

^aAmerican National Standards institute (ANSI), 1430 Broadway, New York, NY 10018. ANSI regularly updates its standards. The ANSI standards in this table are those that OSHA adopted in 1971. Since the ANSI standards which were then adopted had been set in 1967-1969, those standards, now required under OSHA, may be less stringent than the most recent ANSI standards.

TABLE 6-2

GENERAL PPE INSPECTION CHECKLISTS¹

CLOTHING

Before use:

- o Determine that the clothing material is correct for the specified task at hand.
- o Visually inspect for:
 - imperfect seams
 - non-uniform coatings
 - tears
 - malfunctioning closures
- o Hold up to light and check for pinholes
- o Flex product:
 - observe for cracks
 - observe for other signs of shelf deterioration
- o If the product has been used previously, inspect inside and out for signs of chemical degradation:
 - discoloration
 - swelling
 - stiffness

During the work task, periodically inspect for:

- o Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind, however, that chemical permeation can occur without any visible effects.
- o Closure failure.
- o Tears.
- o Punctures.
- o Seam discontinuities.

(1) Specific procedures recommended by equipment manufacturers should be followed.

TABLE 6-2 (cont.)

GLOVES

- o **BEFORE USE**, pressurize glove to check for pinholes. This can be accomplished by inflating the glove and holding it under water. No air should escape.

RESPIRATORS

SCBA

- o Inspect air supply/cascade system:
 - before and after each use
 - at least monthly when in storage
 - every time they are cleaned
- o Check all connections for tightness.
- o Check material conditions for:
 - pliability
 - signs of deterioration
 - signs of distortion
- o Check for proper setting and operation of regulators and valves (according to manufacturers' recommendations).
- o Check operation of alarm(s).
- o Check face mask and lenses for:
 - cracks
 - crazing
 - fogginess

Supplied-Air Respirators

- o Inspect Supplied Air Respirators:
 - daily when in use
 - at least monthly when in storage
 - every time they are cleaned
- o Inspect air lines prior to each use for cracks, kinks, cuts, frays, and weak areas.
- o Check for proper setting and operation of regulators and valves (according to manufacturers' recommendations).

TABLE 6-2 (cont.)

RESPIRATORS (cont.)

o Check all connections for tightness.

o Check material conditions for:

- signs of pliability
- signs of deterioration
- signs of distortion

o Check face mask and lenses for:

- cracks
- crazing
- fogginess

Air-Purifying Respirators

o Inspect air-purifying respirators:

- before each use
- after each use
(before using a newly supplied respirator ensure that the storage bag is sealed)

o Check mask for:

- pliability
- signs of deterioration
- distortion
- missing or broken parts

o Examine cartridges or canisters to ensure that:

- they are the proper type for the intended use

o Check face shields and lenses for:

- cracks
- crazing
- fogginess

o Perform positive and negative pressure fit tests prior to use

Table 6-3
PROTECTIVE ENSEMBLES¹

LEVEL OF PROTECTION	EQUIPMENT	PROTECTION PROVIDED	SHOULD BE USED WHEN:	LIMITING CRITERIA
A	<p>RECOMMENDED:</p> <ul style="list-style-type: none"> • Pressure-demand, full-facepiece SCBA or pressure-demand supplied-air respirator with escape SCBA. • Fully-encapsulating, chemical-resistant suit. • Inner chemical-resistant gloves. • Chemical-resistant safety boots/shoes. • Two-way radio communications. <p>OPTIONAL:</p> <ul style="list-style-type: none"> • Cooling unit. • Coveralls. • Long cotton underwear. • Hard hat. • Disposable gloves and boot covers. 	<p>The highest available level of respiratory, skin, and eye protection.</p>	<ul style="list-style-type: none"> • The chemical substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either: <ul style="list-style-type: none"> – measured (or potential for) high concentration of atmospheric vapors, gases, or particulates or – site operations and work functions involving a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the intact skin. • Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible. • Operations must be conducted in confined, poorly ventilated areas until the absence of conditions requiring Level A protection is determined. 	<ul style="list-style-type: none"> • Fully-encapsulating suit material must be compatible with the substances involved.
B	<p>RECOMMENDED:</p> <ul style="list-style-type: none"> • Pressure-demand, full-facepiece SCBA or pressure-demand supplied-air respirator with escape SCBA. • Chemical-resistant clothing (coveralls and long-sleeved jacket; hooded, one- or two-piece chemical splash suit; disposable chemical-resistant one-piece suit). • Inner and outer chemical-resistant gloves. • Chemical-resistant safety boots/shoes. • Hard hat. • Two-way radio communications. <p>OPTIONAL:</p> <ul style="list-style-type: none"> • Coveralls. • Disposable boot covers. • Face shield. • Long cotton underwear. 	<p>The same level of respiratory protection but less skin protection than Level A.</p> <p>It is the minimum level recommended for initial site entries until the hazards have been further identified.</p>	<ul style="list-style-type: none"> • The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection. This involves atmospheres: <ul style="list-style-type: none"> – with IDLH concentrations of specific substances that do not represent a severe skin hazard; or – that do not meet the criteria for use of air-purifying respirators. • Atmosphere contains less than 19.5 percent oxygen. • Presence of incompletely identified vapors or gases is indicated by direct-reading organic vapor detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the intact skin. 	<ul style="list-style-type: none"> • Use only when the vapor or gases present are not suspected of containing high concentrations of chemicals that are harmful to skin or capable of being absorbed through the intact skin. • Use only when it is highly unlikely that the work being done will generate either high concentrations of vapors, gases, or particulates or splashes of material that will affect exposed skin.

¹Based on EPA protective ensembles.

¹From "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities", NIOSH/OSHA/USCG/EPA, 1985.

Table 6-3 (cont)
PROTECTIVE ENSEMBLES

LEVEL OF PROTECTION	EQUIPMENT	PROTECTION PROVIDED	SHOULD BE USED WHEN:	LIMITING CRITERIA
C	<p>RECOMMENDED:</p> <ul style="list-style-type: none"> • Full-facepiece, air-purifying, canister-equipped respirator. • Chemical-resistant clothing (coveralls and long-sleeved jacket; hooded, one- or two-piece chemical splash suit; disposable chemical-resistant one-piece suit). • Inner and outer chemical-resistant gloves. • Chemical-resistant safety boots/shoes. • Hard hat. • Two-way radio communications. <p>OPTIONAL:</p> <ul style="list-style-type: none"> • Coveralls. • Disposable boot covers. • Face shield. • Escape mask. • Long cotton underwear. 	<p>The same level of skin protection as Level B, but a lower level of respiratory protection.</p>	<ul style="list-style-type: none"> • The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin. • The types of air contaminants have been identified, concentrations measured, and a canister is available that can remove the contaminant. • All criteria for the use of air-purifying respirators are met. 	<ul style="list-style-type: none"> • Atmospheric concentration of chemicals must not exceed IDLH levels. • The atmosphere must contain at least 19.5 percent oxygen.
D	<p>RECOMMENDED:</p> <ul style="list-style-type: none"> • Coveralls. • Safety boots/shoes. • Safety glasses or chemical splash goggles. • Hard hat. <p>OPTIONAL:</p> <ul style="list-style-type: none"> • Gloves. • Escape mask. • Face shield. 	<p>No respiratory protection. Minimal skin protection.</p>	<ul style="list-style-type: none"> • The atmosphere contains no known hazard. • Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals. 	<ul style="list-style-type: none"> • This level should not be worn in the Exclusion Zone. • The atmosphere must contain at least 19.5 percent oxygen.

7.0 DECONTAMINATION

7.1 Introduction

The objective of decontamination is to remove hazardous substances from workers and equipment, to assure compliance with DOE order 5480.11 and OSHA Standard 1910.120, and to preclude the occurrence of potential adverse health effects that could be caused by contact with hazardous materials. Decontamination requirements and procedures at the 881 Hillside will vary according to the task being performed and the hazardous materials encountered. It is not expected that EG&G employees will be involved in the direct handling of hazardous waste materials during the initial phases of the remediation activities at this site. The anticipated job functions of EG&G employees include: project management, site inspections, air monitoring for chemical and radiological contaminants, and radiological monitoring of personnel and equipment leaving the site. The majority of this work will be conducted outside of the exclusion zone (EZ) in either the contamination reduction zone (CRZ) or the site support zone where only minimal or no decontamination will be required. In the event that decontamination of EG&G personnel or equipment is required it is expected that they will use the decontamination equipment provided by the contractor performing the remediation work and follow the approved decontamination procedures that the contractor has established.

7.2 Decontamination Procedures

7.2.1 Personnel & Small Equipment Decontamination

Decontamination procedures for the various phases of work to be conducted at the 881 Hillside will be determined by the hazardous materials present at each site. The hazardous materials known to be present thus far include organic solvents, heavy metals, and radionuclides. It is the responsibility of the EG&G Radiation Protection and Radiological Engineering Representatives assigned to the site to determine if radiological contamination of personnel or equipment exists and to prescribe the decontamination procedures that will be required. The persons to contact for radiological assistance are identified in Chapter 2 (Responsibilities) of this document. The requirements for chemical decontamination will depend on the type of chemical present. Safe

work practices are to be exercised at all times to prevent or minimize personnel and equipment contamination. Proper personal protective equipment shall be used as an additional measure to prevent direct employee exposure to hazardous substances. Examples of decontamination equipment requirements, decontamination site layouts, and specific decontamination procedures for levels A, B, and C protective equipment ensembles are provided in figures 7-1 through 7-12.

7.2.2 Heavy Equipment decontamination

It is not anticipated that EG&G will be providing or operating heavy equipment such as backhoes, graders, front end loaders, etc. at the 881 Hillside. Any such heavy equipment used by contractors at the site will need to be checked for contamination and decontaminated if necessary prior to leaving the area. Each contractor will be responsible for submitting a monitoring and decontamination plan for their equipment to EG&G for approval prior to starting work. Typical decontamination procedures used within the facility include:

Large pieces of equipment such as forklifts will be frisked with radiation survey instruments and dry wiped as needed to meet radiological decontamination standards. Such equipment should be rinsed with clean water and/or steam and inspected by the RPT prior to being transferred from the site. Equipment leaving the Controlled Area shall be monitored as stipulated in HSP 18.02 prior to release.

FIGURE 7-1

EQUIPMENT NEEDED TO PERFORM MAXIMUM DECONTAMINATION MEASURES FOR LEVELS A, B, AND C

- | | | | |
|------------|---|-------------|---|
| Station 1: | a. Various Size Containers
b. Plastic Liners
c. Plastic Drop Cloths | Station 10: | a. Containers (20-30 Gallons)
b. Plastic Liners
c. Bench or Stools
d. Boot Jack |
| Station 2: | a. Containers (20-30 Gallons)
b. Decon Solution or Detergent Water
c. 2-3 Long-Handled, Soft-Bristled Scrub Brushes | Station 11: | a. Rack
b. Drop Cloths
c. Bench or Stools |
| Station 3: | a. Containers (20-30 Gallons)
OR
High-Pressure Spray Unit
b. Water
c. 2-3 Long-Handled, Soft-Bristled Scrub Brushes | Station 12: | a. Table |
| Station 4: | a. Containers (20-30 Gallons)
b. Plastic Liners | Station 13: | a. Basin or Bucket
b. Decon Solution
c. Small Table |
| Station 5: | a. Containers (20-30 Gallons)
b. Plastic Liners
c. Bench or Stools | Station 14: | a. Water
b. Basin or Bucket
c. Small Table |
| Station 6: | a. Containers (20-30 Gallons)
b. Plastic Liners | Station 15: | a. Containers (20-30 Gallons)
b. Plastic Liners |
| Station 7: | a. Containers (20-30 Gallons)
b. Decon Solution or Detergent Water
c. 2-3 Long-Handled, Soft-Bristled Scrub Brushes | Station 16: | a. Containers (20-30 Gallons)
b. Plastic Liners |
| Station 8: | a. Containers (20-30 Gallons)
OR
High-Pressure Spray Unit
b. Water
c. 2-3 Long-Handled, Soft-Bristled Scrub Brushes | Station 17: | a. Containers (20-30 Gallons)
b. Plastic Liners |
| Station 9: | a. Air Tanks or Face Masks and Cartridge Depending on Level
b. Tape
c. Boot Covers
d. Gloves | Station 18: | a. Water
b. Soap
c. Small Table
d. Basin or Bucket
e. Field Showers
f. Towels |
| | | Station 19: | a. Dressing Trailer is Needed in Inclement Weather
b. Tables
c. Chairs
d. Lockers
e. Cloths |

EQUIPMENT NEEDED TO PERFORM MINIMUM DECONTAMINATION MEASURES FOR LEVELS A, B, AND C

- | | | | |
|------------|--|------------|---|
| Station 1: | a. Various Size Containers
b. Plastic Liners
c. Plastic Drop Cloths | Station 4: | a. Air Tanks or Masks and Cartridges Depending Upon Level
b. Tape
c. Boot Covers
d. Gloves |
| Station 2: | a. Containers (20-30 Gallons)
b. Decon Solution
c. Rinse Water
d. 2-3 Long-Handled, Soft-Bristled Scrub Brushes | Station 5: | a. Containers (20-30 Gallons)
b. Plastic Liners
c. Bench or Stools |
| Station 3: | a. Containers (20-30 Gallons)
b. Plastic Liners
c. Bench or Stools | Station 6: | a. Plastic Sheets
b. Basin or Bucket
c. Soap and Towels
d. Bench or Stools |
| | | Station 7: | a. Water
b. Soap
c. Tables
d. Wash Basin or Bucket |

FIGURE 7-2

MINIMUM DECONTAMINATION LAYOUT

LEVELS A & B PROTECTION

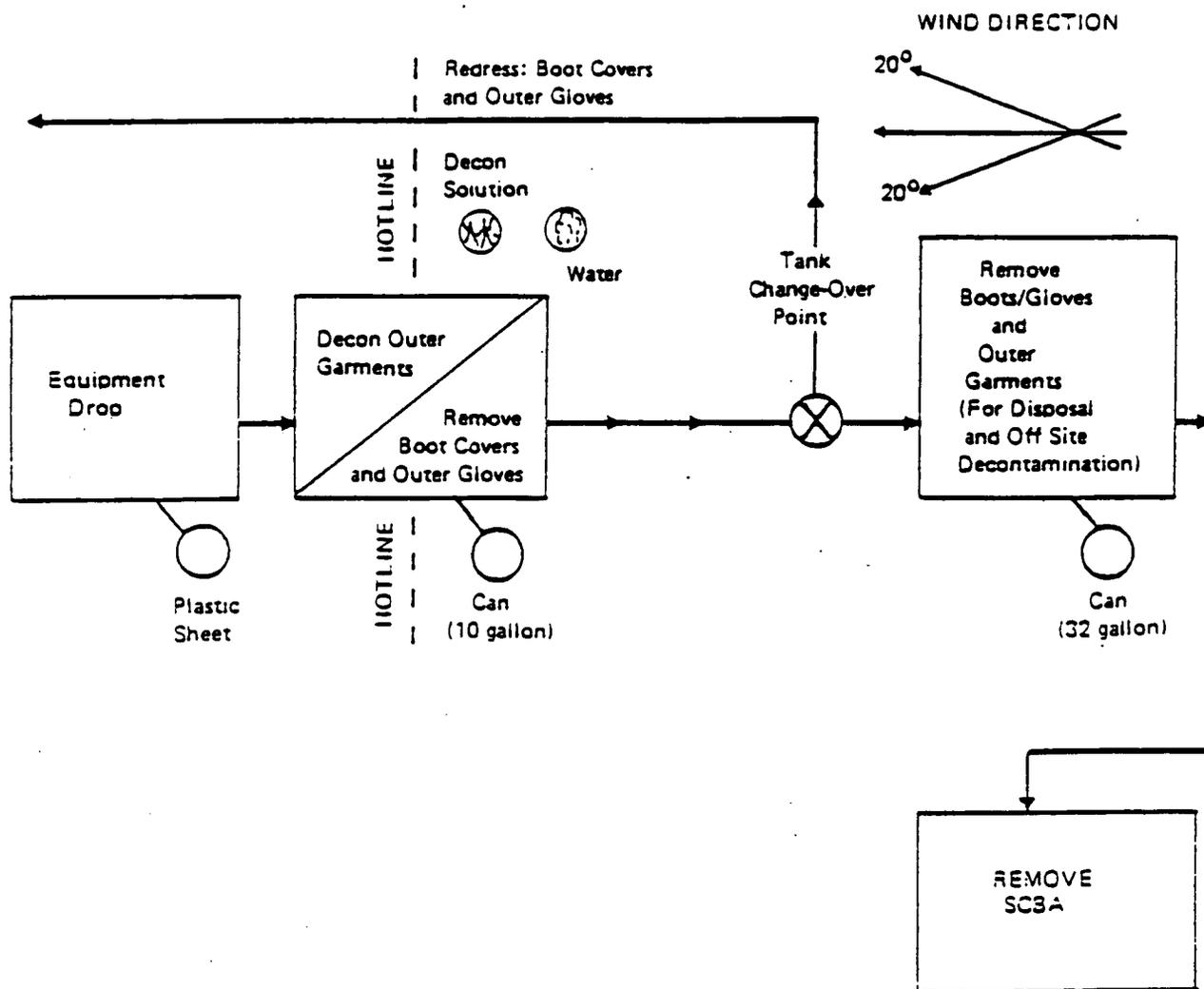


FIGURE 7-3

MINIMUM DECONTAMINATION LAYOUT

LEVEL C PROTECTION

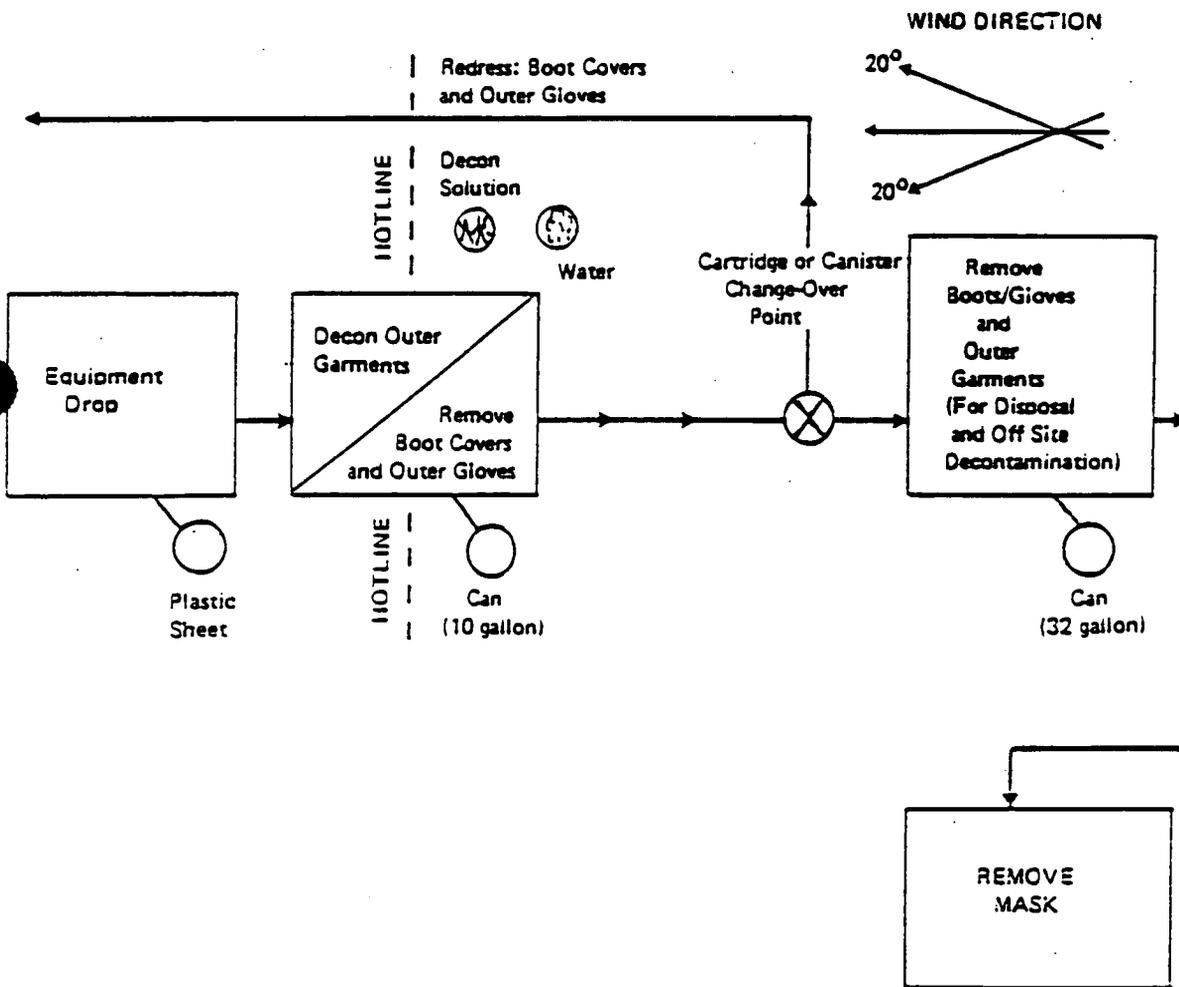


FIGURE 7-4

MAXIMUM DECONTAMINATION LAYOUT

LEVEL A PROTECTION

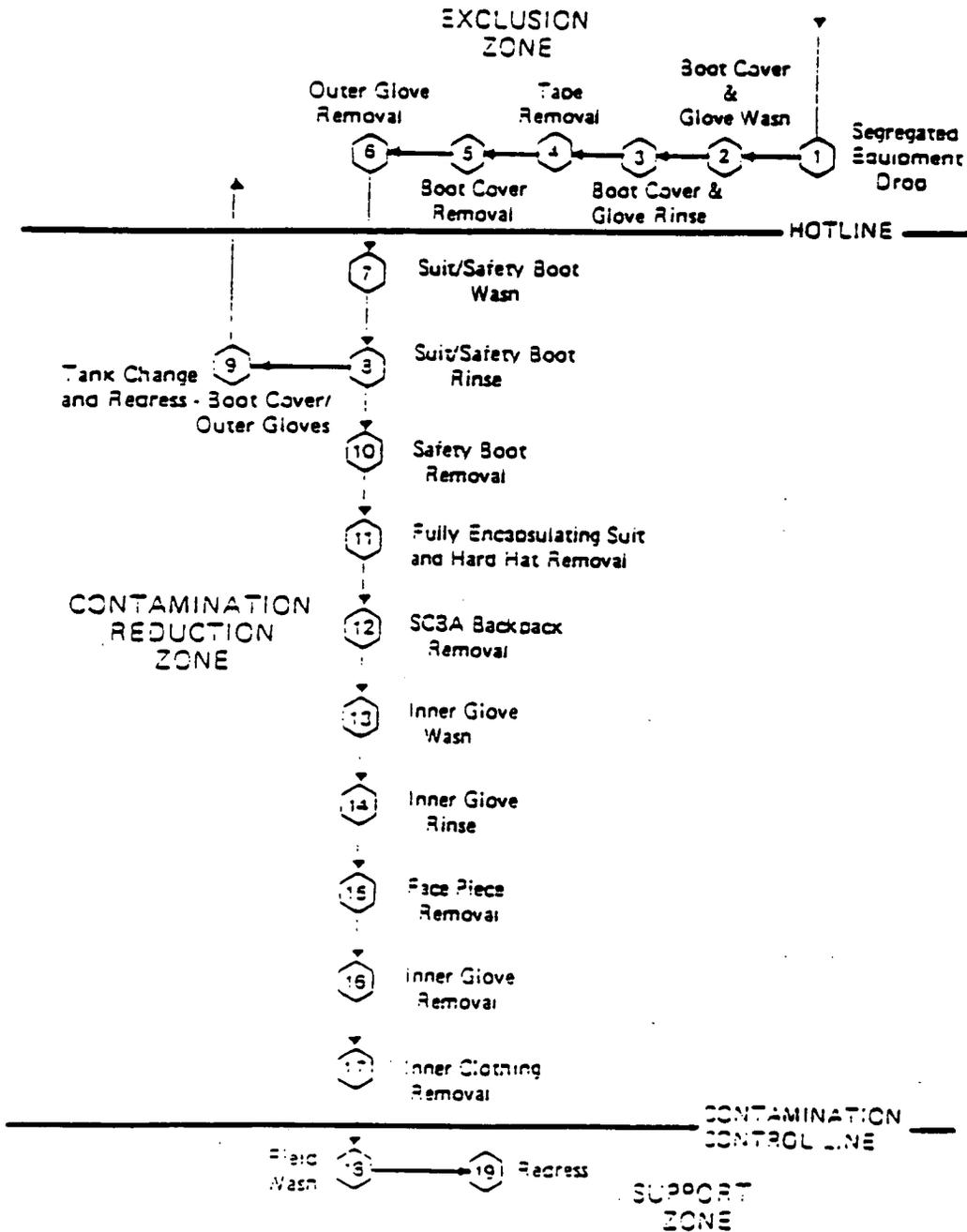


FIGURE 7-5

MAXIMUM MEASURES FOR LEVEL A DECONTAMINATION

- | | |
|---|--|
| Station 1: Segregated Equipment Drop | 1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. During hot weather operations, a cool down station may be set up within this area. |
| Station 2: Boot Cover and Glove Wash | 2. Scrub outer boot covers and gloves with decon solution or detergent/water. |
| Station 3: Boot Cover and Glove Rinse | 3. Rinse off decon solution from station 2 using copious amounts of water. |
| Station 4: Tape Removal | 4. Remove tape around boots and gloves and deposit in container with plastic liner. |
| Station 5: Boot Cover Removal | 5. Remove boot covers and deposit in container with plastic liner. |
| Station 6: Outer Glove Removal | 6. Remove outer gloves and deposit in container with plastic liner. |
| Station 7: Suit and Boot Wash | 7. Wash encapsulating suit and boots using scrub brush and decon solution or detergent/water. Repeat as many times as necessary. |
| Station 8: Suit and Boot | 8. Rinse off decon solution using water. Repeat as many times as necessary. |
| Station 9: Tank Change | 9. If an air tank change is desired, this is the last step in the decontamination procedure. Air tank is exchanged, new outer gloves and boot covers donned, and joints taped. Worker returns to duty. |
| Station 10: Safety Boot Removal | 10. Remove safety boots and deposit in container with plastic liner. |
| Station 11: Fully Encapsulating Suit and Hard Hat Removal | 11. Fully encapsulated suit is removed with assistance of a helper and laid out on a drop cloth or hung up. Hard hat is removed. Hot weather rest station maybe set up within this area for personnel returning to site. |
| Station 12: SCBA Backpack Removal | 12. While still wearing facepiece, remove backpack and place on table. Disconnect hose from regulator valve and proceed to next station. |
| Station 13: Inner Glove Wash | 13. Wash with decon solution that will not harm the skin. Repeat as often as necessary. |
| Station 14: Inner Glove Rinse | 14. Rinse with water. Repeat as many times as necessary. |
| Station 15: Face Piece Removal | 15. Remove face piece. Deposit in container with plastic liner. Avoid touching face with fingers. |
| Station 16: Inner Glove Removal | 16. Remove inner gloves and deposit in container with liner. |

FIGURE 7-6

MAXIMUM MEASURES FOR LEVEL A DECONTAMINATION

- | | |
|------------------------------------|---|
| Station 17: Inner Clothing Removal | 17. Remove clothing and place in lined container. Do not wear inner clothing off-site since there is a possibility that small amounts of contaminants might have been transferred in removing the fully-encapsulating suit. |
| Station 18: Field Wash | 18. Shower if highly toxic, skin-corrosive or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available. |
| Station 19: Redress | 19. Put on clean clothes. |

MINIMUM MEASURES FOR LEVEL A DECONTAMINATION

- | | |
|--|---|
| Station 1: Equipment Drop | 1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations maybe set up within this area. |
| Station 2: Outer Garment, Boots, and Gloves Wash and Rinse | 2. Scrub outer boots, outer gloves and fully-encapsulating suit with decon solution or detergent and water. Rinse off using copious amounts of water. |
| Station 3: Outer Boot and Glove Removal | 3. Remove outer boots and gloves. Deposit in container with plastic liner. |
| Station 4: Tank Change | 4. If worker leaves Exclusion Zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty. |
| Station 5: Boot, Gloves and Outer Garment Removal | 5. Boots, fully-encapsulating suit, inner gloves removed and deposited in separate containers lined with plastic. |
| Station 6: SCBA Removal | 6. SCBA backpack and facepiece is removed (avoid touching face with fingers). SCBA deposited on plastic sheets. |
| Station 7: Field Wash | 7. Hands and face are thoroughly washed. Shower as soon as possible. |

FIGURE 7-7

MAXIMUM DECONTAMINATION LAYOUT

LEVEL 3 PROTECTION

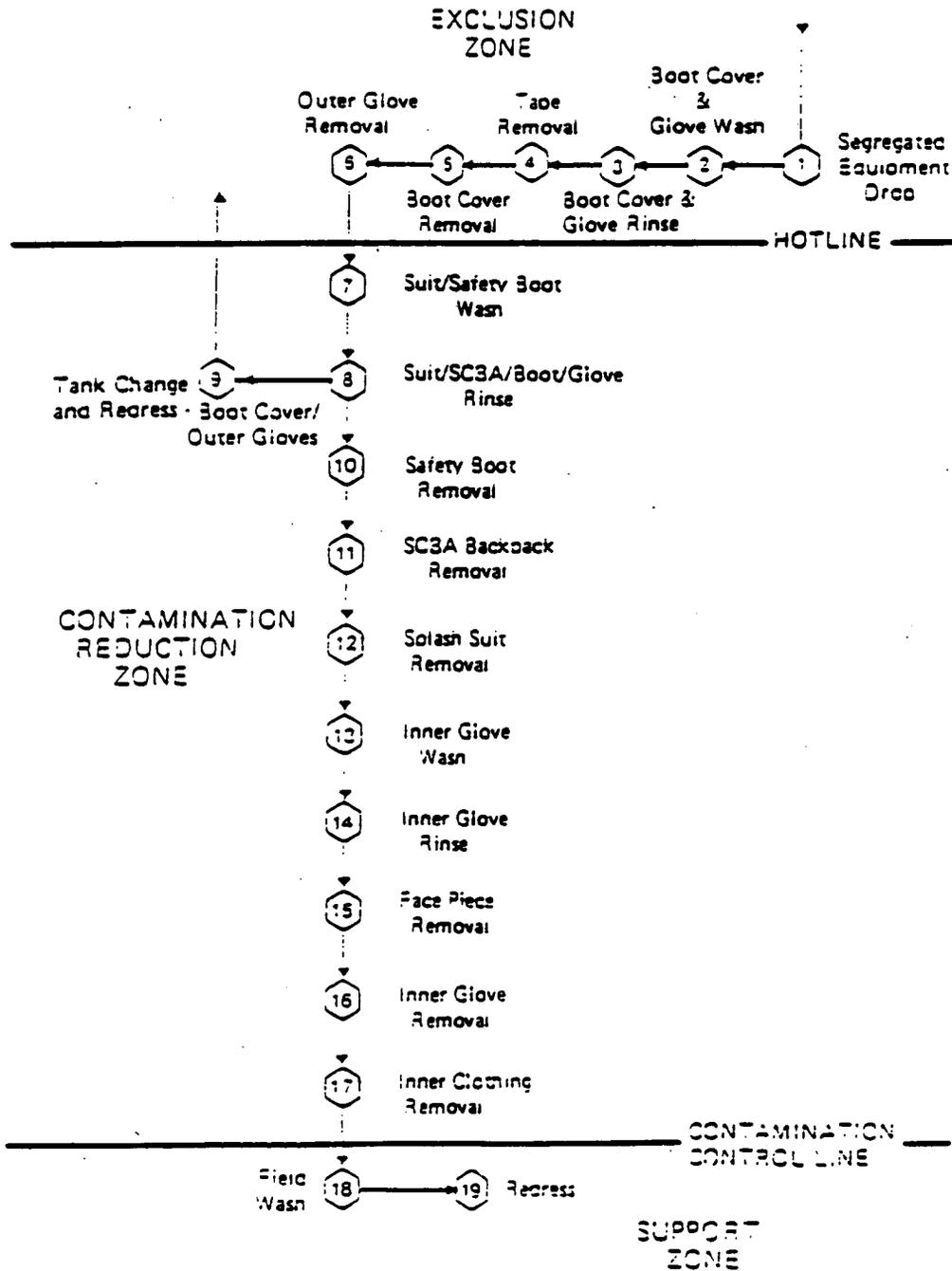


FIGURE 7-8

MAXIMUM MEASURES FOR LEVEL 8 DECONTAMINATION

- | | |
|--|--|
| Station 1: Segregated Equipment Drop | 1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability of cross-contamination. During hot weather operations, cooldown stations may be set up within this area. |
| Station 2: Boot Cover and Glove Wash | 2. Scrub outer boot covers and gloves with decon solution or detergent and water. |
| Station 3: Boot Cover and Glove Rinse | 3. Rinse off decon solution from station 2 using copious amounts of water. |
| Station 4: Tape Removal | 4. Remove tape around boots and gloves and deposit in container with plastic liner. |
| Station 5: Boot Cover Removal | 5. Remove boot covers and deposit in container with plastic liner. |
| Station 6: Outer Glove removal | 6. Remove outer gloves and deposit in container with plastic liner. |
| Station 7: Suit and Safety Boot Wash | 7. Wash chemical-resistant splash suit, SCBA, gloves and safety boots. Scrub with long-handle scrub brush and decon solution. Wrap SCBA regulator (if belt mounted type) with plastic to keep out water. Wash backpack assembly with sponges or cloths. |
| Station 8: Suit, SCBA, Boot, and Glove Rinse | 8. Rinse off decon solution using copious amounts of water. |
| Station 9: Tank Change | 9. If worker leaves exclusion zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boot covers donned, and joints taped. Worker returns to duty. |
| Station 10: Safety Boot Removal | 10. Remove safety boots and deposit in container with plastic liner. |
| Station 11: SCBA Backpack Removal | 11. While still wearing facepiece, remove backpack and place on table. Disconnect hose from regulator valve. |
| Station 12: Splash Suit Removal | 12. With assistance of helper, remove splash suit. Deposit in container with plastic liner. |
| Station 13: Inner Glove Wash | 13. Wash inner gloves with decon solution. |
| Station 14: Inner Glove Rinse | 14. Rinse inner gloves with water. |
| Station 15: Face Piece Removal | 15. Remove face piece. Deposit in container with plastic liner. Avoid touching face with fingers. |
| Station 16: Inner Glove Removal | 16. Remove inner gloves and deposit in container with liner. |

FIGURE 7-9

MAXIMUM MEASURES FOR LEVEL B DECONTAMINATION:

- | | |
|------------------------------------|---|
| Station 17: Inner Clothing Removal | 17. Remove inner clothing. Place in container with liner. Do not wear inner clothing off-site since there is a possibility that small amounts of contaminants might have been transferred in removing the fully-encapsulating suit. |
| Station 18: Field Wash | 18. Shower if highly toxic, skin-corrosive or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available. |
| Station 19: Redress | 19. Put on clean clothes. |

MINIMUM MEASURES FOR LEVEL B DECONTAMINATION

- | | |
|--|---|
| Station 1: Equipment Drop | 1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down station may be set up within this area. |
| Station 2: Outer Garment, Boots, and Gloves Wash and Rinse | 2. Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent water. Rinse off using copious amounts of water. |
| Station 3: Outer Boot and Glove Removal | 3. Remove outer boots and gloves. Deposit in container with plastic liner. |
| Station 4: Tank Change | 4. If worker leaves exclusive zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty. |
| Station 5: Boot, Gloves and Outer Garment Removal | 5. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic. |
| Station 6: SCBA Removal | 6. SCBA backpack and facepiece is removed. Avoid touching face with finger. SCBA deposited on plastic sheets. |
| Station 7: Field Wash | 7. Hands and face are thoroughly washed. Shower as soon as possible. |

FIGURE 7-10

MAXIMUM DECONTAMINATION LAYOUT

LEVEL C PROTECTION

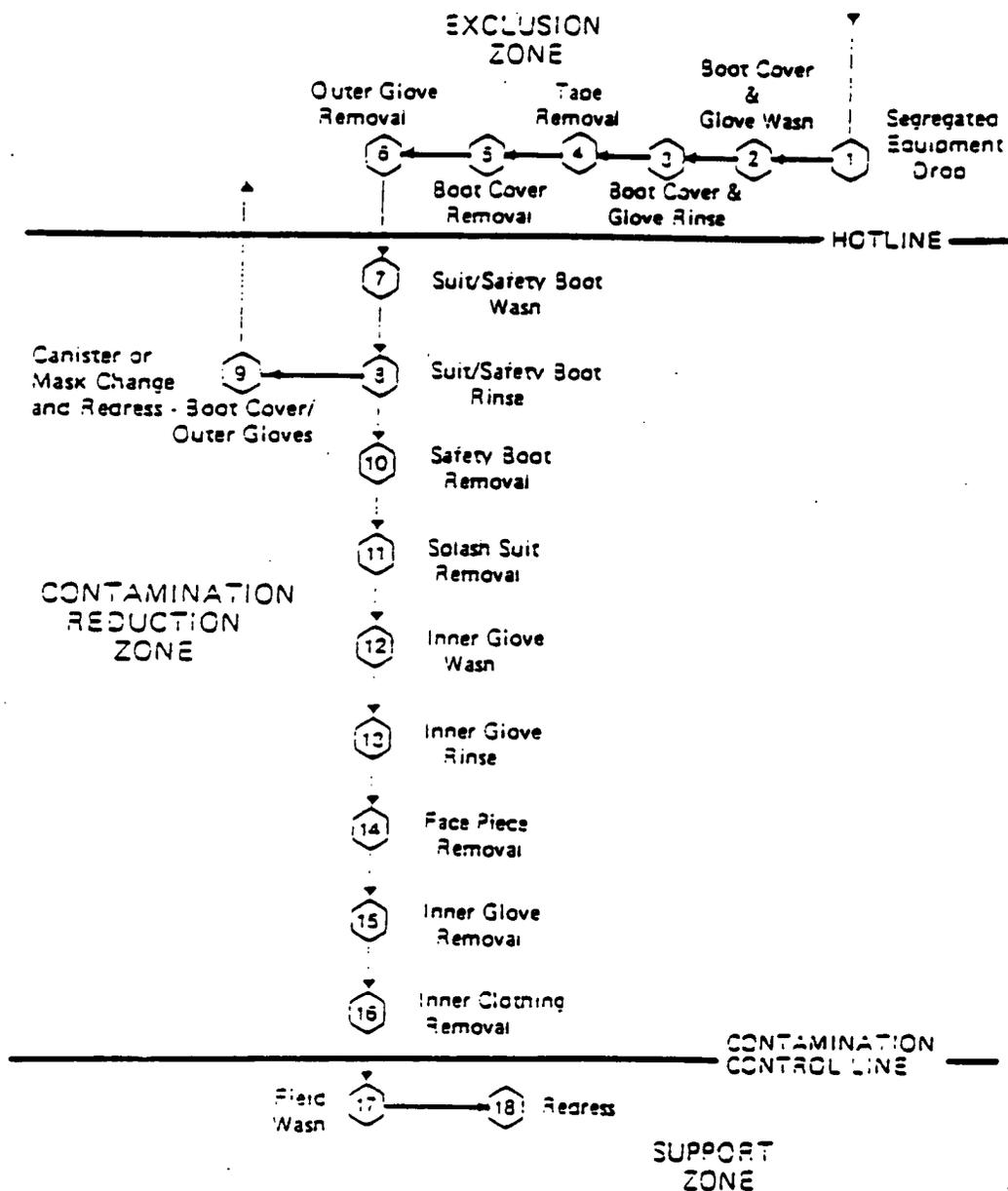


FIGURE 7-11

MAXIMUM MEASURES FOR LEVEL C DECONTAMINATION

- | | |
|---|--|
| Station 1: Segregated Equipment Drop | 1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool down station may be set up within this area. |
| Station 2: Boot Cover and Glove Wash | 2. Scrub outer boot covers and gloves with decon solution or detergent and water. |
| Station 3: Boot Cover and Glove Rinse | 3. Rinse off decon solution from station 2 using copious amounts of water. |
| Station 4: Tape Removal | 4. Remove tape around boots and gloves and deposit in container with plastic liner. |
| Station 5: Boot Cover Removal | 5. Remove boot covers and deposit in containers with plastic liner. |
| Station 6: Outer Glove Removal | 6. Remove outer gloves and deposit in container with plastic liner. |
| Station 7: Suit and Boot Wash | 7. Wash splash suit, gloves, and safety boots. Scrub with long-handle scrub brush and decon solution. |
| Station 8: Suit and Boot, and Glove Rinse | 8. Rinse off decon solution using water. Repeat as many times as necessary. |
| Station 9: Canister or Mask Change | 9. If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, and joints taped worker returns to duty. |
| Station 10: Safety Boot Removal | 10. Remove safety boots and deposit in container with plastic liner. |
| Station 11: Splash Suit Removal | 11. With assistance of helper, remove splash suit. Deposit in container with plastic liner. |
| Station 12: Inner Glove Rinse | 12. Wash inner gloves with decon solution. |
| Station 13: Inner Glove Wash | 13. Rinse inner gloves with water. |
| Station 14: Face Piece Removal | 14. Remove face piece. Deposit in container with plastic liner. Avoid touching face with fingers. |
| Station 15: Inner Glove Removal | 15. Remove inner gloves and deposit in lined container. |

FIGURE 7-12

MAXIMUM MEASURES FOR LEVEL C DECONTAMINATION

- | | |
|------------------------------------|--|
| Station 16: Inner Clothing Removal | 16. Remove clothing soaked with perspiration and place in lined container. Do not wear inner clothing off-site since there is a possibility that small amounts of contaminants might have been transferred in removing the fully-encapsulating suit. |
| Station 17: Field Wash | 17. Shower if highly toxic, skin-corrosive or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available. |
| Station 18: Redress | 18. Put on clean clothes. |

MINIMUM MEASURES FOR LEVEL C DECONTAMINATION

- | | |
|--|---|
| Station 1: Equipment Drop | 1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool down station may be set up within this area. |
| Station 2: Outer Garment, Boots, and Gloves Wash and Rinse | 2. Scrub outer boots, outer gloves and splash suit with decon solution or detergent water. Rinse off using copious amounts of water. |
| Station 3: Outer Boot and Glove Removal | 3. Remove outer boots and gloves. Deposit in container with plastic liner. |
| Station 4: Canister or Mask Change | 4. If worker leaves exclusive zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty. |
| Station 5: Boot, Gloves and Outer Garment Removal | 5. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic. |
| Station 6: Face Piece Removal | 6. Facepiece is removed. Avoid touching face with fingers. Facepiece deposited on plastic sheet. |
| Station 7: Field Wash | 7. Hands and face are thoroughly washed. Shower as soon as possible. |

8.0 MEDICAL SURVEILLANCE

8.1 Introduction

The medical surveillance requirements of OSHA (29 CFR 1910.120(f)) provide the framework for a medical monitoring program for workers involved in hazardous waste operations and emergency response. The standard includes provisions for baseline, periodic, and termination medical examinations to monitor for potential exposures to hazardous materials and conditions.

The Occupational Health Department, under the direction of the Occupational Health Director, is responsible for the Rocky Flats Plant (RFP) Medical Surveillance Program. The Medical Surveillance Program is designed to detect early signs of adverse health effects from chemical, radiological and physical hazards at the RFP and to facilitate protective measures.

The Occupational Health Department provides comprehensive physical examinations to all EG&G employees at no cost to the employee and without loss of pay. The exam results are used to assess the health status and physical fitness of employees and to ensure that work assignments do not exceed the employee's physical capabilities.

8.2 Frequency of Medical Examinations

EG&G employees assigned to work at the 881 Hillside must undergo a baseline medical examination prior to initiating on-site activities. After the initial exam, employees must have a follow-up medical exam at least once a year for as long as they work at the site. The attending physician may suggest a shorter or longer interval, but it must not be in excess of two years.

Such a decision may be based on one or all of the following factors:

- o chemical or physical hazards employees may be exposed to while working in or around the 881 Hillside;
- o concentration(s) of chemicals present in the work area;

- o health effects experienced by employee(s) which may be associated with hazards at the 881 Hillside; and
- o acute exposure(s) as a result of an emergency.

Employees must be trained to recognize symptoms such as dizziness, nausea, skin rash, etc. which may be indicative of exposure to hazards at the site. In the event that any such symptoms develop, or where a suspected overexposure occurs, the affected personnel must receive a medical examination as soon as possible after the incident or injury.

A worker who is reassigned to an area not associated with hazardous waste or terminates employment, thereby reducing the potential of exposure to hazardous substances, must have a final medical exam if one has not been performed within the past six months. The content of the follow-up examination and employee termination examination will include, at least, those items included in the pre-placement examination. The physician can then make comparisons to previous data and possibly detect early signs of adverse health effects and facilitate protective measures. The attending physician may add to the testing and/or examination as needed.

8.3 Content of Medical Examinations

The content of the medical examination will be determined by the Occupational Health Director, or in certain situations, by a private attending physician and may include the following elements:

- o a complete occupational and medical history emphasizing those signs and/or symptoms associated with exposure(s) to the hazardous materials identified in Section 3.0,
- o smoking history,
- o chest x-ray,

- o pulmonary function test (PFT),
- o electrocardiogram (EKG),
- o blood test and analyses for contaminants of concern identified in Section 3,
- o urine test and analyses for contaminants of concern identified in Section 3,
- o liver function test,
- o examination of eye, nose, and throat,
- o examination of the nervous system,
- o examination of the spine and other musculoskeletal systems,
- o audiogram,
- o pulse rate,
- o body temperature, and
- o baseline bioassay.

The examining physician will provide a written opinion of the employees ability and fitness to perform the required job task(s) and wear a respirator (Hazardous Waste Operations Form RF-47322). The physician will also take into consideration the fact that the employee may:

- o experience temperature extremes as a result of environmental conditions and/or wearing protective clothing, and
- o exert themselves physically as a result of performing the required job tasks.

8.4 Availability of Service

The Occupational Health Department is located in Building 122. The full staff is on duty from 7:30 a.m. to 4:00 p.m. Monday through Friday. The registered nursing staff is on duty from 6:30 a.m., on Monday, through 10:00 p.m., on Friday. A physician and a nurse are always on call for any emergency during off hours. Weekend coverage (Friday, 10:00 p.m. through Monday, 6:30 a.m.) is provided by emergency medical technicians (EMTs). They can be contacted at Extension 4336 and will meet employees in the Occupational Health Department or respond to the site of any emergency.

8.5 Transportation for Medical Reasons

The company will provide transportation for employees (if it is medically safe as determined by the Occupational Health Staff) to their home or to an appropriate medical facility for:

- o an emergency: Occupational Health/EMTs will determine the appropriate mode of transportation for illness/injury requiring air or ground ambulance transport, or
- o a non-emergency: if there is no medical necessity for ambulance transport, supervisors will be asked to arrange transportation.

In a situation where an employee is injured and requires non-ambulance transport to an off-site medical facility, the supervisor or designee shall accompany that person as a representative of the company and be available to interface with outside authorities (if necessary), and to provide further transportation for the employee as appropriate.

Supervisors unable to arrange transportation on weekends or during night work should contact the Shift Superintendent (RFP Emergency Coordinator) for assistance.

8.6 Occupational Health Department Responsibilities

The Occupational Health Department has the responsibility of assisting management in ensuring the placement of employees in work situations that will not create undue hazard(s) to the individual, co-workers, plant facilities, the public, and the environment. The Medical Surveillance Program provides the database for these decisions. The Occupational Health Department is also responsible for applying preventive medical measures toward the maintenance of good physical and mental health of employees.

8.7 Supervisor's Responsibility

Supervisor responsibilities pertaining to medical surveillance requirements include:

- o confirming through the Occupational Health Department that employees are fit and do not have restrictions that will interfere with their job performance;
- o recognizing detectable signs and symptoms of over-exposure to chemical or physical hazards. Information pertaining to recognition of such signs or symptoms is acquired through resources such as the OSHA Health and Safety training, Material Safety Data Sheets, and the hazard identification information provided in chapter 3 of this document;
- o sending employees to the Occupational Health Department for a work restriction or re-evaluation if there has been a change in the employees physical or mental condition; and
- o consulting personnel files regarding employee restrictions prior to placing a job applicant in a vacancy.

8.8 Employee's Responsibility

Medical surveillance requirements are not only the responsibility of the Occupational Health Department and supervisors, but also the responsibility of each employee. These responsibilities include:

- o advising their supervisors of any physical or mental conditions which could affect work performance;
- o recognizing the detectable signs or symptoms of over-exposure to chemical or physical hazards;
- o reporting all occupational injuries or illnesses immediately;
- o reporting to the Occupational Health Department to have limitations verified or restrictions imposed (Restrictions recommended by an off-site physician must be presented in writing to the Occupational Health Department.); and
- o reporting to the Occupational Health Department for re-evaluation as scheduled.

8.9 Work Practices

Work assignments may be temporarily or permanently modified based on an employee's physical or mental state, and environmental factors. The Occupational Health Department will perform an assessment, communicate the need for a medical restriction to appropriate persons, and follow up on restriction status.

8.10 Medical Records

All medical information will be maintained by the Occupational Health Department, in the individual's file, including laboratory reports, EKG reports, X-ray reports, health histories, physical examinations, letters, and reports from employee's personal or referral physician.

8.10.1 Release of Medical Records and Medical Information

The medical record will remain in the possession of the Occupational Health Department and will not be taken from the premises except for the purpose of answering subpoenas. Copies of the medical record will be released to the employee, insurance companies, attorneys, hospitals, and/or physicians when a written authorization has been presented to the Occupational Health Department. A written authorization must:

- o specify that either EG&G or Rocky Flats is to release the information,
- o be dated within the last 60 days,
- o specify to whom the information is to be released,
- o be completed in ink, and
- o be signed by the employee.

Medical information may not be released to anyone on plant site (supervisors, co-workers, etc.) without a written authorization from the employee.

The employees of the Occupational Health Department and employees in Health & Safety (H&S) Records, who are authorized by the Occupational Health Director, are the only employees who will have access to medical records.

Release of records associated with work-related or alleged work-related illness and injury does not require signed consent. A release may be requested to expedite communication with attending physicians.

8.11 Subcontractor Medical Surveillance Program

Subcontractors are responsible for providing and implementing a medical surveillance program for all of their employees assigned to work at the 881 Hillside that meet the requirements of 29 CFR 1910.120 (f)(2).

Subcontractors will be given a copy of this 881 Hillside HSP to use in developing their health and safety program. The chemical, radiological and physical hazards known to be present at the site are identified in the hazard assessment portion of this document (Chapter 3). This information and any additional information concerning hazards at the specific work location should be provided to their consulting physician so that a medical surveillance program can be developed which addresses the site specific hazards.

The subcontractor physician must provide written authorization that each employee working at the 881 Hillside is fit to work. These records should be kept on file at the site and should be available for review by RFP personnel. If respiratory protection is required at the site, the physician must provide authorization that the employee is medically qualified to wear a respirator. All subcontractor personnel required to wear a respirator will be fit tested by the EG&G Industrial Hygiene Department.

9.0 AIR MONITORING

9.1 Introduction

The monitoring procedures for EG&G personnel working on the 881 Hillside, include those for chemical contaminants and for radiological contaminants. The objectives of the monitoring program are:

- o to characterize dusts, mists, fumes, gases, and vapors present in the 881 Hillside work areas;
- o to acquire sufficient quantitative data which will be used to determine appropriate levels of personal protective equipment, site control measures and boundaries, decontamination procedures; and
- o to identify conditions that may be immediately dangerous to life or health.

9.2 Chemical Related Air Monitoring

9.2.1 Sampling Strategy

Breathing zone samples will be collected from employees with the maximum potential for exposure to airborne contaminants such as organic vapors, metals and respirable particulates. A sufficient number of samples will be obtained for statistically valid results.

9.2.2 Monitoring

Based on expected contaminants, sampling during similar operations, and industrial hygiene references and regulations, airborne levels of the following compounds will be evaluated:

Organics- Tetrachloroethane, 2-butanone, phthalates, methylene chloride, acetone, 1,1,1-trichloroethylene, trichloroethene, dichloroethene and scans for additional organic compounds not identified in the hazard assessment

Metals - antimony, arsenic, barium, cadmium, manganese, mercury, other metals as needed

Respirable Dust

Other compounds may be monitored based on continuing evaluation by Industrial Hygiene.

9.2.3 Procedures

- o Sampling will be in accordance with procedures set by the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH).
- o Sampled workers will be notified of air sampling results in a timely manner.
- o Area and personal monitoring for compounds listed above will be performed daily until a sufficient number of samples are collected to establish exposure levels, followed by periodic sampling as required. Initial sampling results will also be used to reevaluate personal protection equipment requirements.

Table 9-1 lists the equipment and calibration requirements for sampling of the compounds listed above. Table 9-2 lists the permissible exposure limits and action levels for compounds which may be present at the site.

9.3 Radiological Monitoring

Radiological monitoring involves the detection and measurement of alpha, beta, and gamma radioactivity. The monitoring shall be conducted for airborne radionuclides, surface contamination, and internal contamination of equipment.

9.3.1 Air Monitoring

High volume air samplers are used in the vicinity of 881 Hillside for ambient air monitoring. The limits of acceptable airborne radiological particulate exposure are referred to as Derived Air Concentrations (DACs) which are listed in Table 9-3. Should exposure exceed 10% of the DAC, Level C protection shall be required. The methodology of Routine Air Sampling is described in Rocky Flats Radiological Operating Instruction (ROI) 4.1.

Environmental contamination control monitoring programs are being developed by the Radiological Engineering Department and will be implemented when they are available.

9.3.2 Decontamination Verification

All persons shall have a whole body alpha scan and equipment will be smeared for alpha activity by a Radiation Protection Technologist (RPT) prior to leaving a "Controlled Area". Alpha activity should be less than 250 cpm (using a Ludlum 12-1A) or appropriate decontamination procedures will be followed.

9.3.3 Surface Contamination Surveys

Radiological Operations is responsible for overseeing routine contamination surveys at the 881 Hillside. The frequency of such surveys is based on the judgement of the responsible Radiological Engineer. The specific methodologies associated with surface contamination surveys are described in the Radiological Operating Instruction (ROI) 3.1. Contamination control limits for alpha and beta/gamma surface activity, as specified in the ROI, are listed in Tables 9-4 .

**Table 9-1
Sampling Instrumentation**

<u>EQUIPMENT</u>	<u>MATERIALS SAMPLED</u>	<u>CALIBRATION</u>
Constant flow air sampling pump	Metals Organics Respirable dust Phthalates	daily, before and after sampling
Colorimetric tubes and Pumps	As applicable	pump calibrations as per manufacturer instruction
Photoionization detector (PID)	Organics as applicable	daily, before and after sampling
Infrared detector	Organics as applicable	as per manufacturer instruction
Sound level meter, Noise dosimeter	Noise	before and after use
WBGT monitor	Heat Stress	as per manufacturer instructions

**Table 9-2
Chemical Permissible Exposure Limits¹ and Level C Action Levels***

NOTE: All concentrations in milligrams per cubic meter (mg/m³) unless otherwise indicated.

<u>CHEMICAL</u>	<u>8-Hour PEL/TLV</u>	<u>CEILING/ STEL</u>	<u>SKIN HAZARDS</u>	<u>ACTION LEVEL LEVEL C PPE</u>
Acetone	1780(TLV)	2380(STEL)		890
Carbon Tetrachloride	10(PEL)	25(CEILING)	X	5
1,1-Dichloroethane	400(PEL)	1010(STEL)		200
1,2-Dichloroethane	40(TLV)			20
Methylene Chloride	174(TLV)	1000(PPM)		87
Tetrachloroethylene	339(TLV)	1368(STEL)		169.5
1,1,2,2-Tetrachloro- ethane	6.9(TLV)		X	3.45
Toluene	200(PEL)	300(CEILING)		100
1,1,1-Trichloroethane	1910(PEL)	2460(STEL)		805
1,1,2-Trichloroethane	45(PEL)		X	22.5
Respirable Quartz	0.1(PEL)			0.05
Barium	0.5(PEL)			0.25
Cadmium	0.05(TLV)	0.6		0.1
Arsenic	0.5(PEL)			0.25
Mercury	0.1		X	0.05
Manganese	5(TLV)	5		2.5

¹ PELs from OSHA 1910.1000, TLVs from ACGIH "Threshold Limit Values and Biological Exposure Indices for 1989-1990"

* Level B will be required if single or accumulative exposures exceed 50 times the Permissible Exposure Limits, as determined by the Industrial Hygiene Department.

Table 9-3
Derived Air Concentrations (DAC) for Controlling Radiation Exposures to Workers at DOE Facilities, from Attachment 1, page 4 of DOE Order 5480.11 dated 12-21-88.

Inhaled Air - Lung Retention Class

Radionuclide	D (uCi/mL)	W (uCi/mL)	Y (uCi/mL)	Stochastic or Organ ^{1/} (D/W/Y)
H-3 (Water) ^{2/}	2.E-05	2.E-05	2.E-05	St/St/St
H-3 (Elemental) ^{2/}	5.E-01	5.E-0	5.E-01	St/St/St
Pu-239	-	2.E-12	6.E-12	-/BS/BS
Am-241	-	2.E-12	-	-/BS/-
U-233	5.E-10	3.E-10	2.E-11	BS/St/St
U-234	5.E-10	3.E-10	2.E-11	BS/St/St
U-238	6.E-10	3.E-10	2.E-11	BS/St/St

1/ A determination of whether the DAC's are controlled by stochastic (St) or nonstochastic (organ) dose, or if they both give the same result (E) for each lung retention class is given in this column. The key to the organ notation for nonstochastic dose is: BS = Bone Surface, K = Kidney, L = Liver, Sin = Stomach wall, and T = Thyroid. A blank indicates that no calculations are performed for the lung retention class shown.

2/ The ICRP identifies tritiated water and carbon as having immediate uptake and distribution; therefore, no solubility classes are designated. For purposes of this table, the DAC values are shown as being constant, independent of solubility class. For tritiated water, the inhalation DAC values allow for an additional 50% absorption through the skin, as described in ICRP Publication No. 30: Limits for Intakes of Radionuclides by Workers. For elemental tritium, the DAC values are based solely on consideration of the dose-equivalent rate to the tissues of the lung from inhaled tritium gas contained within the lung, without absorption in the tissues.

**Table 9-4
Contamination Control Limits**

<u>AREA</u>	<u>REMOVABLE ALPHA</u>		<u>FIXED AND REMOVABLE ALPHA</u>
	<u>Smears</u> (dpm/100 cm ²)	<u>Swipes</u> (cpm by Ludlum 12-1A)	(cpm by Ludlum 12-1A)
Uncontrolled	< 20	N/A	< 250
Controlled	< 20	N/A	< 250
Radiological	20-200	< 250	250-750
Contamination	> 200	> 250	> 750

<u>AREA</u>	<u>REMOVABLE BETA/GAMMA</u>	<u>FIXED AND REMOVABLE BETA/GAMMA</u>
	(dpm/100 cm ²)	(dpm/100 cm ²)
Uncontrolled	< 1000	< 5000
Controlled	< 1000	< 5000
Radiological	1000-5000	≥ 5000
Contamination	> 5000	

10.0 TRAINING

EG&G personnel assigned to the 881 Hillside must complete the Health and Safety training required by OSHA and site specific training courses required by EG&G. The 881 Hillside is an Interim Response Action which is classified as a hazardous waste operation by the OSHA standard (29 CFR 1910.120(a)(i)); therefore the training requirements, including the initial health and safety training, annual update and supervisor training, apply to EG&G personnel working at the site. Additional training courses required by EG&G include hazard communication, radiation worker and respirator training.

10.1 Training Requirements and Course Content

10.1.1 Hazardous Waste Site Health and Safety

Any EG&G employee who is assigned to work at the 881 Hillside must complete the hazardous waste health and safety course required by OSHA in 29 CFR 1910.120(e). The length of the required course may be 40 hours or 24 hours based on the workers' assigned tasks. The 40 hour course and three days of supervised On-The-Job training (OJT) is mandatory for those workers who may be required to use respiratory protective equipment and/or who are engaged in activities in which they may be exposed to hazardous substances and health hazards at or above the PELs.

EG&G employees assigned to the 881 Hillside project who are required to complete 40 hours of training include the ER Project Manager, the ER Health and Safety Officer, the Health and Safety Liaison Officer and the Site Health and Safety Coordinator. Additional personnel "who are onsite occasionally for a specific limited task", such as inspectors, managers and other site visitors, are required to complete a minimum of 24 hours of training and one day of supervised OJT. An outline of the 40 hour course is presented in Table 10-1. The 24 hour course contains the same lecture material as the 40 hour course but does not include the field exercises.

All hazardous waste workers must complete an eight hour refresher course annually. The course content is a summary of the 40 hour course.

Supervisors of hazardous waste sites or of tasks conducted on hazardous waste sites must complete, as a minimum, the same baseline training (24 hour or 40 hour) as the workers they supervise and an additional 8 hour advanced supervisor health and safety course. Table 10-2 is an example of the topics covered in the Supervisor Training Course.

10.1.2 Radiation Worker Training

All EG&G personnel and subcontractors working on ER sites must complete the Radiation Safety course offered by the EG&G Training Department. The course is a self-paced, computer based program which takes approximately one hour to complete.

10.1.3 Site-Specific Training

EG&G employees assigned to work on the 881 Hillside must receive training which introduces the information contained in the Site Health and Safety Plan. The course should provide enough detail that employees can implement the HSP and safely perform their assigned tasks. This training may be incorporated into the 24 or 40 hour hazardous waste health and safety training program and will be coordinated by the ER Project Manager in conjunction with the pre-construction conferences.

10.1.4 Hazard Communication Training

All EG&G employees at Rocky Flats are required to complete the CBT module on Hazard Communication as specified in HSP 9.07. It is also required by OSHA [29 CFR 1910.120 (p)(2)] for workers conducting operations at treatment, storage and disposal facilities such as the Building 885 Drum Storage Area. In the Hazard Communication Training Program, responsibilities for hazardous materials evaluation are assigned and hazard information sources, such as MSDS and the chemical labeling system, are described. The training is a self paced, computer based course which takes approximately one hour to complete. An outline of the course is presented in Table 10-3. Subcontractors are responsible for maintaining their hazard communication training requirements for materials used within their business activities and notifying IH through the Construction Coordinator of any hazardous chemicals to

be brought on site. RFP will inform subcontractors of any hazardous chemicals that may be encountered during operations on site. This may include site-specific training in the hazards of materials used or present in the workplace when applicable. At a minimum, each subcontractor will receive a copy of the Construction Industry OSHA Safety and Health Standards Digest (OSHA 2202), be shown the location of MSDS, and be instructed in the procedures for the disposal of hazardous wastes generated at the facility (HSP 9.07).

10.1.5 Safety Meetings

The Site Health and Safety Coordinator shall conduct periodic safety meetings with EG&G personnel working at the 881 Hillside as required by the EG&G Health and Safety Practices Manual, Procedure 2.01. The discussion at these meetings may include:

- o health and safety considerations and the required PPE for current operations;
- o any revisions to the EG&G HSP;
- o any new MSDS filed on the ER project worksite;
- o documented or observed unsafe acts committed at the worksite, a clarification of the safety requirements violated and methods to prevent future violations; and
- o other topics specified in the EG&G Health and Safety Practices Manual, Procedure 2.01.

All workers are required to attend the meetings and sign the attendance sheet. Meeting minutes will be documented on the Safety Summary Sheet, Form RF-7060, contained in the H&SP Manual. The SHSC will review the meeting minutes with absentees and have them sign the attendance sheet. The SHSC will submit the minutes and the attendance sheet to the ER Health and Safety Officer. This documentation will be retained on file at the worksite and will be archived when the project is completed.

10.1.6 Rehearsal of Emergency Response Plan

OSHA 29 CFR 1910.120 requires rehearsal of the Emergency Response Plans. Such a rehearsal shall be conducted within thirty days of start-up of operations at a hazardous waste site. The ER Health and Safety Officer will coordinate and document the rehearsals which will be used to evaluate the effectiveness of the Plan. The SHSC will coordinate rehearsals with subcontractors so that all site personnel are prepared to respond to an emergency. Emergency response to a Rocky Flats plant emergency will be handled according to the Rocky Flats Emergency Response Plan and will apply to all persons on the RFP site.

10.1.7 Visitor Briefings

Visitors who do not have the required OSHA training and medical certifications shall not be allowed to enter the site exclusion zones or CRZs. All visitors to the 881 Hillside shall have an orientation which summarizes the HSP prior to gaining access to the site. This orientation does not qualify the visitor to access controlled areas of the site. The purpose of the briefing is to provide sufficient information on the hazards and control measures at the site to prevent the visitor from violating any controls unknowingly. Visitors shall be escorted by a trained site employee during the entire visit.

All visitors shall provide signature verification that they have read, understand and will comply with the requirements of the HSP. Signatures are recorded in a logbook, maintained by the project manager, at the site.

10.2 Implementation of Training

Training for EG&G personnel is provided by the EG&G Performance Based Training Department. Most training is conducted in-house with the assistance of various health, safety and environmental departments. Some training is provided by academic organizations or other subcontractors. The Manager of Plant General Employee Training serves as the point of contact for EG&G training course availability. The Manager, Jeff Nair, can be reached at 966-7706.

The training of subcontractors for work at the Rocky Flats Plant is the responsibility of the subcontractor. Training must meet the performance requirements of EG&G and OSHA. Subcontractor personnel will be required to complete EG&G computer based training programs, including Respirator Indoctrination (required if respirators will be worn on site) and Radiation Safety. Respirator fit tests, documented by the EG&G Industrial Hygiene Department, will also be required for all subcontractor personnel who may be required to wear a respirator at the site.

10.3 Performance Evaluations

The training requirements described in this section are designed to teach skills applicable to field work at the 881 Hillside. Workers and supervisors are held responsible for learning and applying these basic skills and concepts. EG&G shall evaluate its workers' abilities through the administration of tests during training courses and field performance evaluations. The training department has established testing procedures and minimum score requirements for course examinations. The SHSC will conduct field audits to evaluate worker health and safety skills. The Health and Safety Liaison Officer will ensure that unannounced audits are done at least quarterly. Below average performance on examinations or field evaluations may disqualify a worker from working at the site until the worker's performance is improved.

10.4 Verification of Training

ER will maintain documentation of the completed required training for all EG&G personnel working at the site, the SHSC will verify this documentation for all affected personnel. Site employees will also provide signature verification that they have read, understood and will comply with the 881 Hillside HSP and the EG&G Health and Safety Program Plan. These records will be kept on file by the ER Health and Safety Office.

Table 10-1
EG&G HAZARDOUS WASTE WORKERS
HEALTH AND SAFETY COURSE CONTENT

Module 1:	Description of Lessons and Instructional Objectives	
Module 2:	Introduction	
Module 3:	Review of Regulations	2
Module 4:	Definitions	
Module 5:	Sources of Hazard Information	3
Module 6:	Hazards in the Work Environment	4
	Section 1: Chemical Hazards.	4
	Section 2: Compressed Gases.	5
	Section 3: Ionizing Radiation.	5
	Section 4: Heat Stress	6
	Section 5: Cold Stress	7
	Section 6: Confined Space.	7
	Section 7: Safety Hazards.	8
	Section 8: Noise	8
Module 7:	Generic Site Safety Plan.	
Module 8:	Incident Command.	9
Module 9:	Medical Surveillance.	10
Module 10:	Toxicology.	10
Module 11:	Site Control, Characterization and Monitoring.	12
Module 12:	Personal Protective Equipment	13

Module 13: PH Acid/Bases 15

Module 14: Decontamination 16

Module 15: Spill Response.....16

Module 16: Level C & B Exercises¹16

¹The 24 hour course does not include Level C or B Exercises

Table 10-2
SUPERVISOR TRAINING COURSE OUTLINE

Manager and Supervisor Responsibilities

1. Worker 24 Hour On-The-Job Training
2. Work Site Characterization
3. Pre-emergency Planning
4. Selection of Proper PPE
5. SARA Title III
6. Legal Aspects of Supervision
7. Potential Problem Analysis
8. Remedial Action - Lessons Learned

Table 10-3
HAZARD COMMUNICATION TRAINING COURSE OUTLINE

Course Content:

- o OSHA, DOE, and Rocky Flats standards and policies on hazard communication
- o Hazardous material evaluation responsibilities
- o The warning labels used at Rocky Flats
- o Material Safety Data Sheets (MSDS)
- o How to obtain hazard information

Course objectives are to train the employee to:

- o describe the OSHA, DOE and Rocky Flats Hazard Communication policies,
- o identify the agencies responsible for hazardous material evaluation,
- o interpret a Rocky Flats warning label,
- o describe the contents and uses of MSDS, and
- o list several different sources from which to obtain hazard information.

11.0 EMERGENCY RESPONSE

11.1 Purpose

The purpose of the Emergency Response Plan for the 881 Hillside is to have a detailed, pre-determined strategy for handling potential emergency situations. Pre-emergency planning is required to expedite appropriate action, thereby minimizing the severity and consequences of potential emergencies. The plan is designed to protect site personnel from possible hazards created by emergency situations. In addition to safeguarding site personnel, the plan is designed to protect plant personnel and the public from contaminants that could move off site, protect property adjacent to the 881 Hillside area and protect equipment loss from hazards associated with 881 Hillside activities. This section details procedures to be followed during an emergency at the 881 Hillside site.

It is critical that key personnel are informed immediately of emergency situations so that response efforts can be carried out effectively. Success will depend on the efforts of appropriate personnel and the input they can provide as a result of training and experience. Teamwork is crucial for abating hazards and minimizing damage.

Emergency assistance should always be requested when it is unclear whether there is a need for support personnel. The contacted party can decide after hearing a description of the problem or after observing the situation whether or not they are needed.

11.2 Notification

LIFE-THREATENING EMERGENCIES--CALL EXTENSION 2911

NON-LIFE-THREATENING EMERGENCIES--CALL EXTENSION 2914

Notification requirements for emergency situations at the 881 Hillside depend on the nature of

the perceived emergency (e.g., spill, injury, illness, fire, etc.,) and the extent to which the damage and/or injuries have progressed. Upon discovery of a release of materials or other non-life-threatening emergency situation, immediately notify the on-site supervisor at extension 5355 and the H&S Area Engineer at extension 7571. The supervisor will evaluate the situation and notify appropriate personnel. If the supervisor is not available and the situation is not life-threatening, notify the Shift Superintendent at extension 2914.

If the supervisor is not available or the situation is life-threatening, notify RFP emergency response personnel as detailed below.

Call 2911 to obtain emergency assistance for life-threatening emergencies and to access the:

- o **Emergency Coordinator (Shift Superintendent)**
- o **Plant Protection Central Alarm Station**
- o **Fire Department Dispatch Center; and**
- o **Medical Department**

Provide as much detail about the emergency as possible. A decision to dispatch any or all of the following equipment will be made on the information provided:

FIRE ENGINE

AMBULANCE

HAZMAT RESPONSE VEHICLE

Provide the following information, upon request, to the Emergency Dispatcher:

- o **Your name**

- o Exact location of the emergency
- o Nature of the emergency
- o Condition of the patient if applicable (breathing, consciousness, bleeding, etc.,)
- o Special hazards in the area
- o Any other information requested

If no details are given, emergency response personnel will respond automatically.

The Emergency Coordinator (EC) will immediately respond to all emergencies. The Plant Protection Central Alarm Station will activate the Building Emergency Support Team (BEST) by the Life Support/Plant Warning (LS/PW) Public Address System. The EC will activate the Emergency Operation Center (EOC) and notify departments that have an advisory role in the situation if applicable. The EC will determine if additional help from off-site agencies (police, hospitals, etc.) is required.

The EC will also notify the following groups when appropriate:

Radiological Engineering	Industrial Hygiene
Industrial Safety	Waste Operations
Waste Programs	Traffic
Event Notification Officer	H&S Operations

Radiological Engineering and Industrial Hygiene will assess any hazards associated with the release of spilled material. Waste Operations will determine the appropriate clean-up techniques and personnel. Waste Programs will evaluate the incident for RCRA/CERCLA reporting requirements. In the event of a spill, notification must also be made to response and reporting at 7264.

Portable fire extinguishers are available for small, controllable incipient fires. All fires, regardless of size, are to be reported to the Fire Department.

11.5 Spills of Hazardous and Radioactive Mixed Waste and Hazardous Material

REPORT TO THE EMERGENCY COORDINATOR AT EXTENSION 2911 all spills greater than one pint or one pound of a hazardous material or waste on the 881 Hillside. The Emergency Coordinator will dispatch the HAZMAT Response Vehicle and any other necessary support personnel.

Spills of less than one pint or one pound of a hazardous waste will be cleaned up by site personnel. Spills onto porous ground will require removal of contaminated dirt as well as the spilled material. The collected material will be placed into a plastic bag and monitored to determine the radioactivity of the waste. Based on existing monitoring and analytical data, all spilled material is expected to be classified as low-level radioactive waste. All spills will be handled according to guidelines as defined in Section HW-11 of the Hazardous and Mixed Waste Resource Conservation Act Standard Operating Procedure Manual.

11.6 Post Emergency Response Equipment Maintenance

Equipment used in emergency situations will be decontaminated by wiping with a soap solution. Rags used for decontamination will be disposed of as low level radioactive waste. Contaminated heavy equipment utilized in emergencies will be thoroughly decontaminated prior to being released from the site. Subcontractors will follow approved decontamination protocols described in their site-specific health and safety plans for heavy equipment decontamination. A decontamination pad for equipment is currently located northwest of the trailer complex on the 881 Hillside. Equipment will not be released until the monitoring indicates that contaminant levels are less than 20 dpm/100 cm² and chemical contamination is not present.

11.7 Emergency Equipment Location

Emergency equipment located on the 881 Hillside include First-Aid kits and fire extinguishers. These items are located in the Subcontractor trailers on site. Fire extinguishers are also located in Subcontractor vehicles and temporarily located on sites where there is a potential for fires (e.g., during welding operations).

11.8 Evacuation Plan

Personnel and visitors on the 881 Hillside will evacuate the area if any of the following occur:

- o If a site emergency such as a fire or chemical spill develops
- o If instructed by site supervision
- o If instructed by the Shift Superintendent over the site radio or phone system

After an evacuation, each supervisor is required to verify that all employees that he/she supervises are accounted for.

11.9 Communication

There are telephones available in Subcontractor trailers on the 881 Hillside. In addition, radios are used by field personnel to maintain contact with Project Managers or other designated persons in the trailers with access to telephones. Radio frequencies are monitored by the plant security system to ensure that response time is minimal in the event of an accident or emergency on site. In the event of a Plant emergency, Central Dispatch will notify the trailers and field personnel by phone and radio. If Central Dispatch fails in the attempt to contact anyone on site, a security car will be sent to the site to alert personnel of the emergency.

12.0 MATERIAL HANDLING

12.1 Introduction

Guidelines for handling, transporting, labeling and disposal of hazardous substances and contaminated soil, liquid and other residue are outlined in 29 CFR 1910.120 (j) "Handling Drums and Containers". It is not anticipated that EG&G employees will be involved in operations which require the handling of containers or drums of hazardous materials; however, subcontractors may be required to have a materials handling program in place for operations at the 881 Hillside.

12.2 Subcontractor Materials Handling Program

Subcontractor Health and Safety Plans should include procedures for material handling, as outlined in the standard, if employees will be handling drums, containers or tanks containing hazardous substances or contaminated materials. The plans shall contain requirements for drum handling and labeling, spill response procedures, guidelines for excavation of drum burial locations, drum opening procedures, specific requirements for handling of radioactive, shock sensitive or laboratory waste, and procedures for shipping and transporting containerized waste as applicable. Standard Operating Procedures for Waste Handling have been developed by the Environmental Restoration Department and will be available to subcontractors for guidance in determining how to containerize and dispose of generated waste.

13.0 NEW TECHNOLOGIES

13.1 Introduction

OSHA requires that employers develop and implement procedures for the introduction of "effective new technologies and equipment developed for the protection of employees" [29 CFR 1910.120 (o)] working at hazardous waste cleanup operations. New products and techniques must be evaluated by employers before they are implemented on a large scale.

13.2 Program Implementation

EG&G has an extensive health, safety and environmental protection program made up of multiple departments with specific areas of expertise. A representative from each of the Health and Safety departments is assigned responsibility for the 881 Hillside. Each representative is responsible for promoting a safe work environment by actively seeking ways to improve safety at the site. Each department (Occupational Safety, Industrial Hygiene, Radiological Engineering etc.) participates in national conferences and seminars at which products and technology are demonstrated and studies of their effectiveness are reviewed. Departmental representatives attending these conferences and seminars are directed to review new products appropriate for use at Hazardous Waste Operations. In addition, EG&G is active in the research and development of new products and technologies through specific government contracts.

13.3 Methods Of Evaluation

OSHA requires that EG&G's efforts, in the area of new product and technology evaluation, be documented and made available to the OSHA inspector upon request. Table 13-1 lists the Departments which are responsible for evaluation of specific products and technologies.

TABLE 13-1
EVALUATION PROCEDURES BY DEPARTMENT

<u>Product or Technologies</u>	<u>Department</u>
Chemical protective clothing	Industrial Hygiene
Respiratory protection	Industrial Hygiene
Equipment used to protect against falls, impacts, explosions etc.	Industrial Safety, Engineering
Radiation safety equipment	Radiological Engineering
Chemical monitoring equipment	Industrial Hygiene
Radiation monitoring equipment	Radiological Engineering
Particulate and vapor emission control devices	Industrial Hygiene, Radiological Engineering, Engineering
Chemical or radiological product spill containment, neutralization, or stabilization products	Radiological Engineering, Engineering
Material handling equipment	Industrial Safety, Engineering